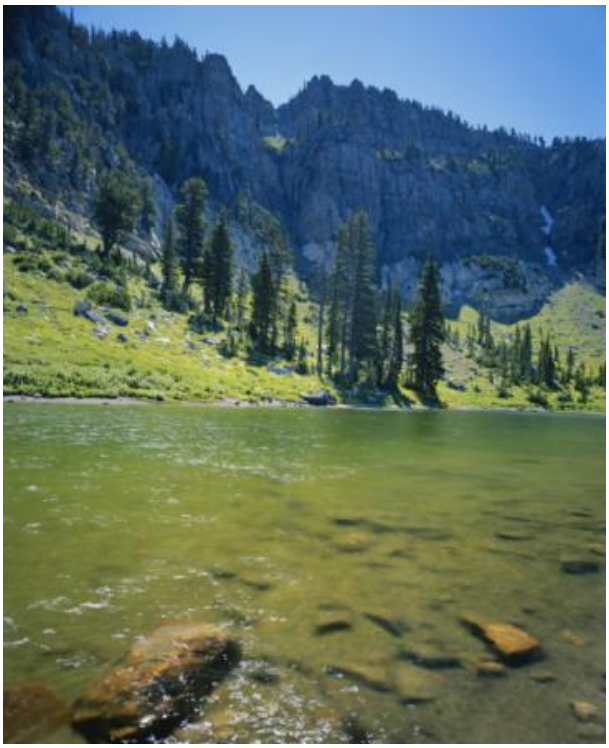

ECONOMIC IMPACT EVALUTAION

Box Elder, Cache, and Rich Counties
August 2016

This report was prepared to provide an economic foundation for the preparation of County Resource Management Plans by the Bear River Association of Governments (BRAG) and member counties. The economic impacts of various resource uses in Box Elder, Cache, and Rich Counties are analyzed and discussed.

Cody Lutz
klutz26@live.com 208-419-6516

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Introduction

The way resources are managed in the Bear River Region has a significant impact on the local economy. Although extractive uses on federal land, such as mining and timber production, are not as significant in the region as they are in other parts of the state, grazing and recreation on federally managed lands make significant economic contributions. Agriculture and livestock production remain important economic sectors in all three counties. The importance of recreational uses, including wildlife recreation, in the region is reflected by employment in sectors that support recreation and tourism, seasonal employment, and the prevalence of second homes. Recreation is particularly important in Rich County, which has a small population and significant recreational attractions. Resource and land management, including fire management, are also associated with significant costs. It is important that land managers consider the potential economic impacts of land uses and policies in the Bear River Region.

Economic Considerations

Trends

Population, employment, and personal income have been steadily rising in all three counties since 1970. The 2014 total population of each county was:

Box Elder- 51,518; Cache- 118,343; Rich- 2,293

Cache County has seen the most growth in each category, with a 178.9% change in population, a 329.3% change in total employment, and a 394.8% change in total personal income, all of which are much higher than the national average. Rich County saw the least population growth with only 42.3% increase since 1970, falling behind the national average of 56.5%. Employment growth was also slowest in Rich County: 72.3%, compared to the national average of 103.6%. Personal income has changed the least in Box Elder County, where it has increased 172.2%, slightly less than the U.S. average of 181.7%. This steady, long-term growth indicates a prosperous economy in the region, and Cache County in particular.

The median age in each county is lower than the national average of 37.4 years. It is highest in Rich County at 35.0 because of the retiree population (nearly 16% of the population is over 65) and lowest in Cache County at 25.2 because of the university. (EPS: Socioeconomic Measures, 2016)

Prosperity

The unemployment rate in the Bear River region is relatively low, averaging 3.4% (down from a high of 6.8% in 2010) and outperforming the national average of 6.2% (2014 figures). Average earnings per job and per-capita income in the region are roughly $17,000 and $15,000 less than the national average, respectively. This gap is likely largely offset by the low cost of living. (EPS: Socioeconomic Measures, 2016)

Non Labor Income

The contribution of non-labor income averaged 32.5% for the region, slightly lower than the national average of 35.8%. Non-labor income is highest in Rich County, which can be an indicator of a large retiree population and high quality of life, which may be partially due to public land amenities. Most of this income came from dividends, interest, rent, and age-related transfer payments. The number of vacation rental properties and homes in Rich County could explain its contribution of non-labor income. Age-related transfer payments have steadily increased their share of non-labor income in the last 40 years as the population has aged. (EPS: Socioeconomic Measures, 2016)

Services Related Employment

Services related jobs made up 54.5% of total employment in Box Elder County, 60.3% in Cache County, 24.0% in Rich County, and 72.1% in the U.S. Services related jobs consist of employment in industries such as retail trade, finance, insurance, and real estate. Service industries created 10,172 new jobs between 1998 and 2013, compared to 2,394 jobs created by non-service industries. Service jobs include

high paying positions like doctors, as well as low paying jobs such as food service. (EPS: Socioeconomic Measures, 2016)

Government Revenue

Federal Land Payments as a Share of Total General Government Revenue, Thousands of FY 2012 (FY 2015 $s)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total General Revenue	31,547	52,575	4,538	88,660	0
Taxes	18,633	26,248	1,292	46,173	0
Intergovernmental Revenue	8,700	14,180	1,747	24,627	0
Total Charges	2,927	11,579	1,116	15,622	0
All Other (Miscellaneous)	1,287	568	383	2,238	0
Federal Land Payments (FY 2011)	3,273	1,204	463	4,940	4,853,194
Percent of Total					
Taxes	59.1%	49.9%	28.5%	52.1%	na
Intergovernmental Revenue	27.6%	27.0%	38.5%	27.8%	na
Total Charges	9.3%	22.0%	24.6%	17.6%	na
All Other (Miscellaneous)	4.1%	1.1%	8.4%	2.5%	na
Federal Land Payments (FY 2011)	10.4%	2.3%	10.2%	5.6%	na

Data Sources: U.S. Department of Interior. 2016. Payments in Lieu of Taxes (PILT), , Washington, D.C.; U.S. Department of Agriculture. 2016. Forest Service, , Washington, D.C.; U.S. Department of Interior. 2016. Bureau of Land Management, , Washington, D.C.; U.S. Department of Interior. 2016. U.S. Fish and Wildlife Service, , Washington, D.C.; U.S. Department of Interior. 2016. Office of Natural Resources Revenue, , Washington, D.C.

The federal government employs 551 people in the region and contributes $46,656,000 in labor earnings. Federal jobs and wages are important to the county because they inject outside money into the local economy. The operational purchases of federal employees support additional jobs in the Bear River Region.

Industry Sectors

Earnings by Industry, 2001-2014 (Thousands of 2015 $s)

	2001	2005	2010	2014	Change 2010-2014
Labor Earnings	$3,052,071	$3,458,410	$3,654,072	$3,819,280	$165,208
Non-services related	~$1,258,564	~$1,446,301	~$1,434,293	~$1,414,263	-~$20,030
Farm	$106,886	$68,675	$51,635	$118,258	$66,623
Forestry, fishing, & ag. services	~$9,143	~$6,849	~$9,550	~$10,158	~$608
Mining (including fossil fuels)	~$4,427	~$7,047	~$7,959	~$19,642	~$11,683
Construction	$153,366	$207,224	~$226,788	$215,097	-~$11,691
Manufacturing	~$984,742	~$1,156,506	~$1,138,361	~$1,051,108	-~$87,253
Services related	~$844,361	$1,064,110	$1,325,228	~$1,679,538	~$354,310
Utilities	$7,508	~$8,537	~$10,433	~$10,140	-~$293
Wholesale trade	~$49,357	~$62,672	~$85,814	~$86,176	~$362
Retail trade	$209,079	$251,281	$249,124	$248,978	-$146
Transportation and warehousing	~$97,352	$139,425	~$125,653	~$144,231	~$18,578
Information	$36,133	$41,902	$33,489	~$55,205	~$21,716
Finance and insurance	~$63,331	~$82,253	~$89,187	~$100,072	~$10,885
Real estate and rental and leasing	~$15,686	~$19,182	~$24,662	~$51,792	~$27,130
Professional and technical services	~$96,875	~$117,950	~$156,500	~$206,188	~$49,688
Management of companies and enterprises	~$126,893	$25,348	~$27,451	~$29,570	~$2,119
Administrative and waste services	~$63,071	$79,129	$76,507	$88,463	$11,956
Educational services	~$3,986	~$9,705	~$16,182	~$20,453	~$4,271
Health care and social assistance	~$154,746	~$210,900	~$287,702	~$348,990	~$61,288
Arts, entertainment, and recreation	~$10,561	~$12,349	~$13,536	~$22,788	~$9,252
Accommodation and food services	~$57,213	~$66,500	~$74,086	~$84,974	~$10,888
Other services, except public administration	$138,809	$164,696	$170,196	$183,198	$13,002
Government	$639,896	$714,370	$772,230	$728,104	-$44,126

Percent of Total*

					% Change 2010-2014
Labor Earnings					4.5%
Non-services related	~41.5%	~41.9%	~39.3%	~37.0%	-~1.4%
Farm	3.5%	2.0%	1.4%	3.1%	129.0%
Forestry, fishing, & ag. services	~0.3%	~0.2%	~0.3%	~0.3%	~6.4%
Mining (including fossil fuels)	~0.1%	~0.2%	~0.2%	~0.5%	~146.8%
Construction	5.1%	6.0%	~6.2%	5.6%	-~5.2%
Manufacturing	~32.5%	~33.5%	~31.2%	~27.5%	-~7.7%
Services related	~27.9%	30.8%	36.3%	~43.9%	~26.7%
Utilities	0.2%	~0.2%	~0.3%	~0.3%	-~2.8%
Wholesale trade	~1.6%	~1.8%	~2.4%	~2.3%	~0.4%
Retail trade	6.9%	7.3%	6.8%	6.5%	-0.1%
Transportation and warehousing	~3.2%	4.0%	~3.4%	~3.8%	~14.8%
Information	1.2%	1.2%	0.9%	~1.4%	~64.8%
Finance and insurance	~2.1%	~2.4%	~2.4%	~2.6%	~12.2%
Real estate and rental and leasing	~0.5%	~0.6%	~0.7%	~1.4%	~110.0%
Professional and technical services	~3.2%	~3.4%	~4.3%	~5.4%	~31.7%
Management of companies and enterprises	~4.2%	0.7%	~0.8%	~0.8%	~7.7%
Administrative and waste services	~2.1%	2.3%	2.1%	2.3%	15.6%
Educational services	~0.1%	~0.3%	~0.4%	~0.5%	~26.4%
Health care and social assistance	~5.1%	~6.1%	~7.9%	~9.1%	~21.3%
Arts, entertainment, and recreation	~0.3%	~0.4%	~0.4%	~0.6%	~68.4%
Accommodation and food services	~1.9%	~1.9%	~2.0%	~2.2%	~14.7%
Other services, except public administration	4.6%	4.8%	4.7%	4.8%	7.6%
Government	21.1%	20.7%	21.2%	19.0%	-5.7%

All earnings data are reported by ***place of work***. Estimates for data that were not disclosed are indicated with tildes (~).

* Total is considered to be the sum of all reported or estimated income with positive values from the earnings by industry table.

Data Sources: U.S. Department of Commerce. 2015. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C. Table CA05N.

Construction, manufacturing, utilities, and government earnings declined in the region between 2000 and 2014. County-specific numbers may be found in the Economic Profile System (EPS) reports titled "socioeconomic measures" followed by the county name.

Employment by Industry, 2014*

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Civilian employed population > 16 years	21,464	53,585	780	75,829	143,435,233
Ag, forestry, fishing & hunting, mining	˙792	1,273	˙129	2,194	2,807,292
Construction	1,266	2,570	˙103	3,939	8,843,718
Manufacturing	5,346	10,334	˙39	15,719	14,955,235
Wholesale trade	˙430	˙780	¨**21**	1,231	3,937,598
Retail trade	3,111	6,145	˙49	9,305	16,598,718
Transportation, warehousing, and utilities	974	1,305	˙57	2,336	7,066,666
Information	˙344	1,097	¨**10**	1,451	3,064,078
Finance and insurance, and real estate	648	2,020	˙48	2,716	9,467,555
Prof, scientific, mgmt, admin, & waste mgmt	1,423	5,254	˙84	6,761	15,618,627
Education, health care, & social assistance	3,838	14,722	˙117	18,677	33,297,237
Arts, entertain., rec., accomodation, & food	1,287	4,291	˙71	5,649	13,610,162
Other services, except public administration	˙607	2,226	¨**16**	2,849	7,112,579
Public administration	1,398	1,568	˙36	3,002	7,055,768
Percent of Total					
Ag, forestry, fishing & hunting, mining	˙3.7%	2.4%	˙16.5%	2.9%	2.0%
Construction	5.9%	4.8%	˙13.2%	5.2%	6.2%
Manufacturing	24.9%	19.3%	˙5.0%	20.7%	10.4%
Wholesale trade	˙2.0%	˙1.5%	¨**2.7%**	1.6%	2.7%
Retail trade	14.5%	11.5%	˙6.3%	12.3%	11.6%
Transportation, warehousing, and utilities	˙4.5%	2.4%	˙7.3%	3.1%	4.9%
Information	˙1.6%	2.0%	¨**1.3%**	1.9%	2.1%
Finance and insurance, and real estate	˙3.0%	3.8%	˙6.2%	3.6%	6.6%
Prof, scientific, mgmt, admin, & waste mgmt	6.6%	9.8%	˙10.8%	8.9%	10.9%
Education, health care, & social assistance	17.9%	27.5%	˙15.0%	24.6%	23.2%
Arts, entertain., rec., accomodation, & food	6.0%	8.0%	˙9.1%	7.4%	9.5%
Other services, except public administration	˙2.8%	4.2%	¨**2.1%**	3.8%	5.0%
Public administration	6.5%	2.9%	˙4.6%	4.0%	4.9%

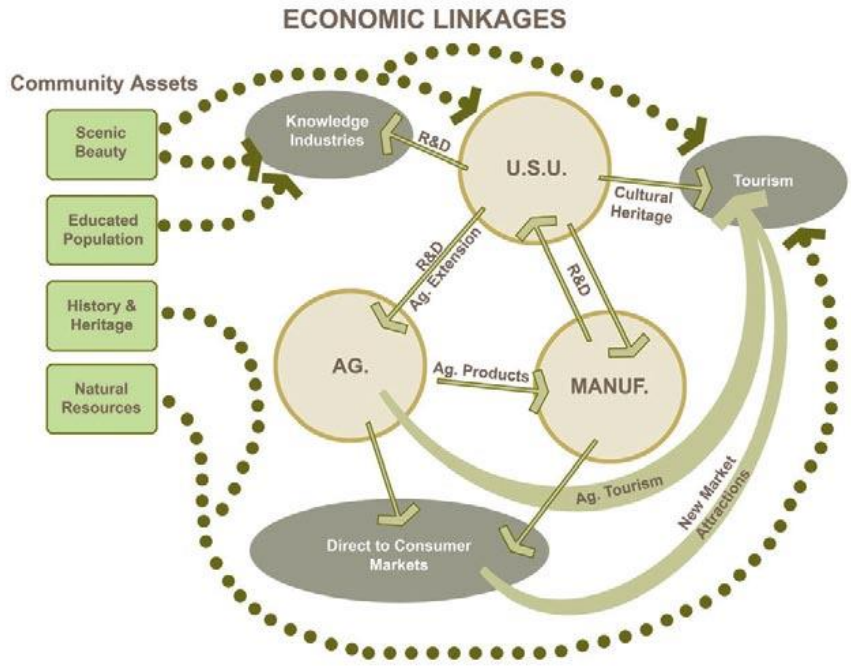
Data Sources: U.S. Department of Commerce. 2015. Census Bureau, American Community Survey Office, Washington, D.C.

Data accuracy is indicated as follows: BLACK indicates a coefficient of variation < 12%; ORANGE (preceded with one dot) indicates between 12 and 40%; and **RED BOLD** (preceded with two dots) indicates a coefficient of variation > 40%.

Industries that include jobs directly dependent on public lands (Ag, forestry, fishing & hunting, mining) made up almost 3% of total employment in the region. Manufacturing was the largest employer in Box Elder County; education, health care, & social assistance is the largest employing industry in Cache County; and agriculture, forestry, fishing & hunting, and mining is the largest industry in Rich County.

The top three industries' share in total employment are: Box Elder County- 57.3%, Cache County- 58.3%, Rich County- 44.7%, U.S.- 45.7%. Economic diversity increases resilience because changes in one industry have a smaller effect on the economy as a whole. Cache County and especially Box Elder County are vulnerable to changes in the demand for manufactured goods. Education, health care, and social assistance are generally steady industries and are not prone to rapid change. Retail trade jobs reflect the ability and willingness of the local population to spend, and are also influenced by visitor spending. The data for Rich County is surprisingly the most diverse, although its smaller economy is still at risk to changes in demand for agricultural products and construction.

The industries in the region are all interconnected. An illustration of the economic connections between different aspects of the economy in Cache County was created by the American Institute of Architects and can be used to better understand the interdependent nature of the regional economy.

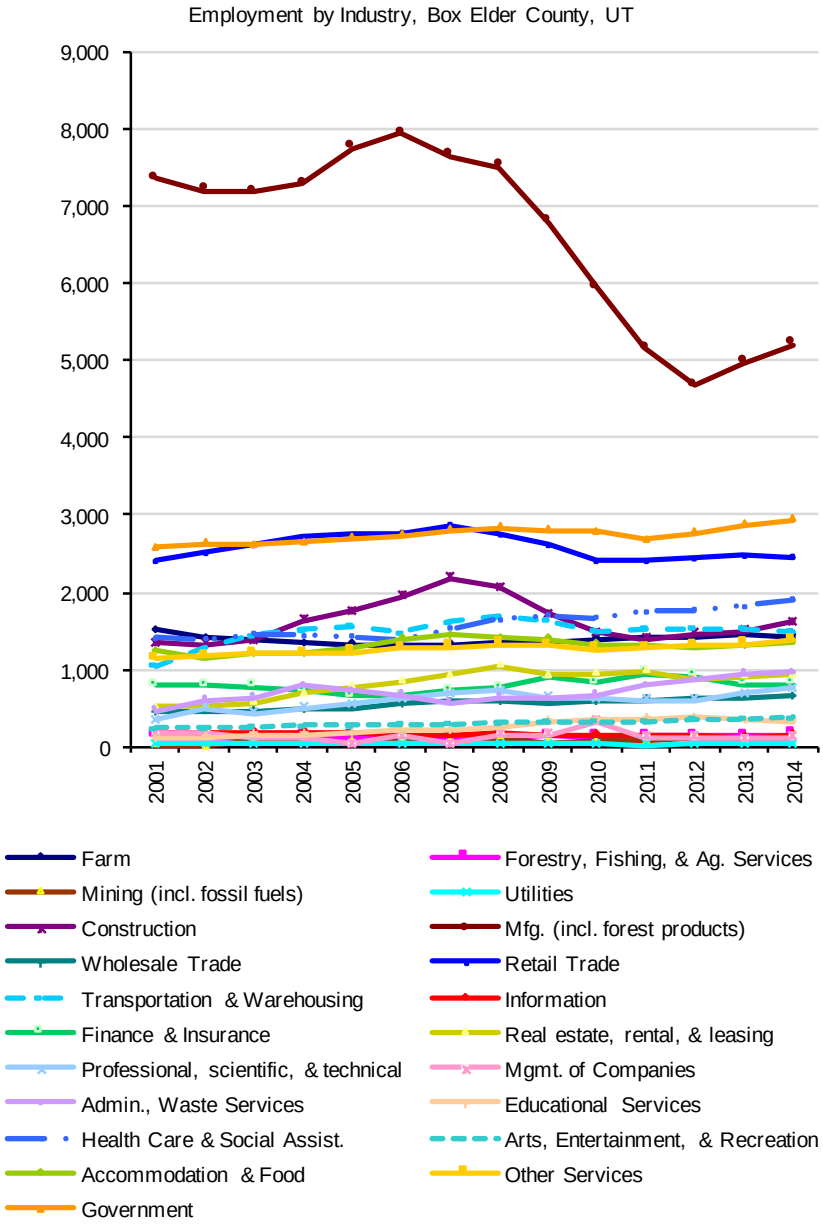


In 2014 the three industry sectors with the largest number of jobs were manufacturing (5,204 jobs), retail trade (2,466 jobs), and health care and social assistance (1,907 jobs).

From 2001 to 2014, the three industry sectors that added the most new jobs were health care and social assistance (502 new jobs), administrative and waste services (493 new jobs), and transportation and warehousing (459 new jobs).

In 2014 the three industry sectors with the largest earnings were manufacturing ($394.4 million), transportation and warehousing ($78.8 million), and health care and social assistance ($65.9 million).

From 2001 to 2014, the three industry sectors that added the most earnings were transportation and warehousing ($38.7 million), health care and social assistance ($28.1 million), and other services, except public administration ($15.4 million).



Data Sources: U.S. Department of Commerce. 2015. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C. Table CA25N.

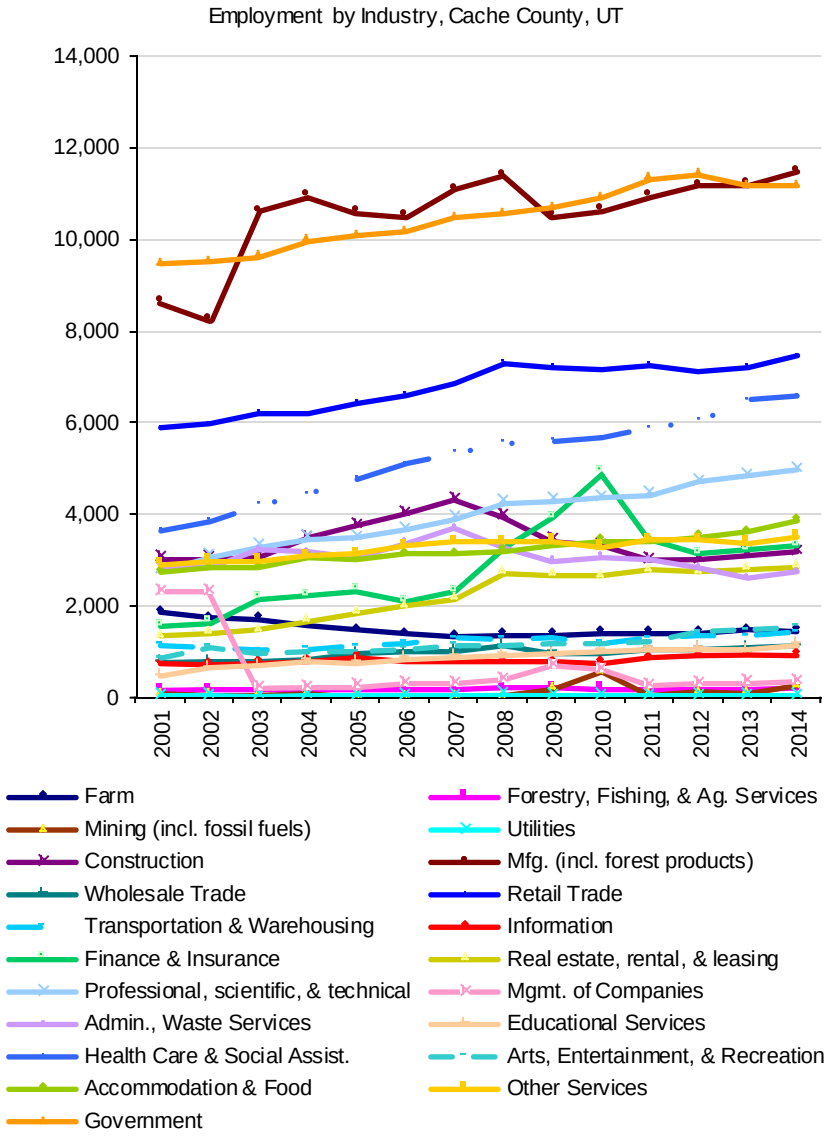
Manufacturing has historically been the largest industry in Box Elder County and still provides the most jobs and earnings, despite a loss of over 3,000 jobs between 2006 and 2012. Government employment also continues to be a major source of employment for the citizens of the county. (Government is actually the second largest industry sector, the Economic Profile System lists the first, third, and fourth largest industries for some reason)

In 2014 the three industry sectors with the largest number of jobs were manufacturing (11,506 jobs), retail trade (7,497 jobs), and health care and social assistance (6,618 jobs).

From 2001 to 2014, the three industry sectors that added the most new jobs were health care and social assistance (2,944 new jobs), professional and technical services (2,213 new jobs), and finance and insurance (1,760 new jobs).

In 2014 the three industry sectors with the largest earnings were manufacturing ($656.7 million), health care and social assistance ($283.1 million), and retail trade ($186.4 million).

From 2001 to 2014, the three industry sectors that added the most earnings were manufacturing ($259.2 million), professional and technical services ($99.2 million), and government ($77.1 million).



Data Sources: U.S. Department of Commerce. 2015. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C. Table CA25N.

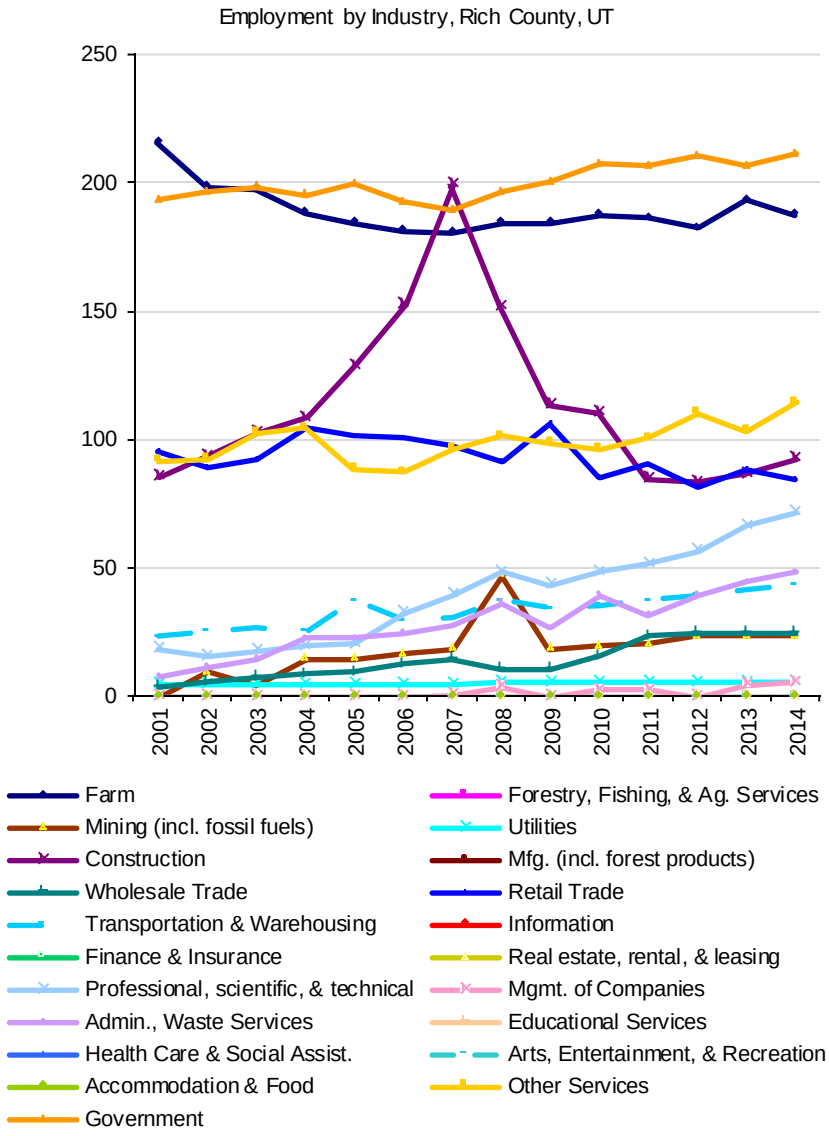
Most industries in Cache County show steady employment growth. Government employment is an important component of the economy in Cache County (a close second). This category could include government employees in education, public land management, and other government services. Most government jobs in all three counties are in local and state governments.

In 2014 the three industry sectors with the largest number of jobs were government (212 jobs), other services, except public administration (115 jobs), and retail trade (85 jobs).

From 2001 to 2014, the three industry sectors that added the most new jobs were professional and technical services (53 new jobs), administrative and waste services (41 new jobs), and other services, except public administration (23 new jobs).

In 2014 the three industry sectors with the largest earnings were farm ($17.8 million), construction ($3.9 million), and retail trade ($1.5 million).

From 2001 to 2014, the three industry sectors that added the most earnings were farm ($11.6 million), professional and technical services ($1.4 million), and other services, except public administration ($1.2 million).



Data Sources: U.S. Department of Commerce. 2015. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C. Table CA25N.

Unlike the other counties, manufacturing is a small part of the economy of Rich County. Although there aren't as many farming jobs as there have been in past decades, farming remains an economic driver, and is the second largest employer. It is common for counties in the West with small populations to have a high proportion of government employment. The data regarding farm earnings is somewhat sporadic and may be over-reported in recent years. Many of the service jobs in the county are catered towards recreational visitors drawn by Bear Lake and surrounding landscapes. Construction jobs spiked in 2007, but in 2014 were only slightly higher than they were in 2001.

Wages by Industry

Average Annual Wages, 2014 (2015 $s)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Private & Public	$34,882	$33,088	$25,402	$33,472	$51,413
Government	$31,503	$37,504	$34,393	$36,142	$51,778
Federal Government	$61,285	$57,150	$31,849	$58,079	$75,860
State Government	$41,151	$45,704	$57,707	$45,565	$54,238
Local Government	$28,058	$29,096	$30,528	$28,804	$46,192
Total Private	$35,484	$32,067	$21,801	$32,887	$51,346
Non-Services	$46,340	$40,177	$30,667	$42,158	$60,317
Natural Resources and Mining	$26,597	$29,711	na	$28,008	$59,726
Ag., Forestry, Fishing, Hunting	$25,946	$28,295	$30,125	$27,178	$30,655
Mining	$36,133	$65,002	na	$45,756	$102,208
Construction	$39,547	$32,270	$29,119	$34,820	$55,096
Manufacturing (Incl. Forest Prod.)	$49,733	$42,084	na	$44,472	$63,040
Services	$26,941	$28,063	$19,922	$27,707	$49,431
Trade, Transportation, Utilities	$32,935	$25,872	$25,862	$28,053	$43,031
Information	$18,591	na	$0	$18,591	$90,894
Financial Activities	$33,212	$35,572	na	$35,165	$85,346
Professional and Business	$25,761	$36,745	$11,378	$34,864	$66,723
Education and Health	$27,711	$31,958	na	$31,049	$45,997
Leisure and Hospitality	$11,720	$12,400	$16,868	$12,356	$21,014
Other Services	$26,530	$24,410	$17,465	$24,616	$33,969
Unclassified	$0	na	$0	$0	$49,497

Data Sources: U.S. Department of Labor. 2015. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.

Employment in the federal government averages the highest annual wages in the region, followed by state government and manufacturing.

Labor Participation

An estimated 34.3% of the working-age population in Rich County does not work, lower than the U.S. average of 25.3%. 23.1% of the population of Cache County worked 15-34 hours per week in 2014 (U.S. average is 14.4%). This is likely due to part-time jobs held by college students. (EPS: Socioeconomic Measures, 2016)

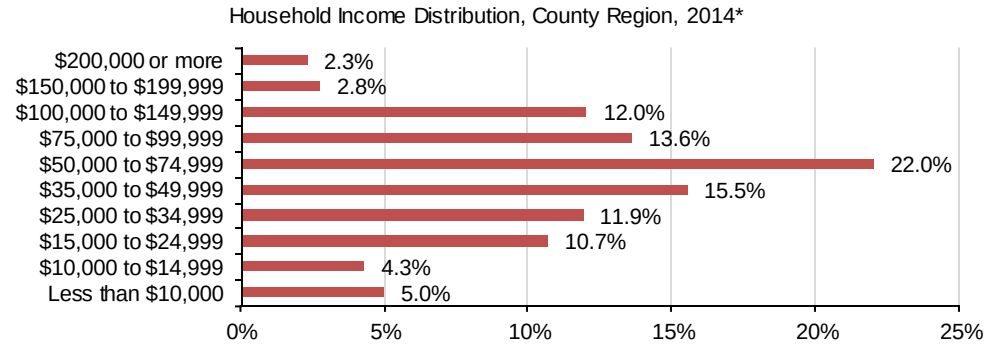
Commuting Patterns

The inflow and outflow of earnings in a county can indicate the commuting tendencies of its residents and the residents of neighboring counties. All three counties have an annual net inflow of earnings from other counties, suggesting that people enjoy living in the Bear River Region even if it means commuting to a different county for work. Box Elder County had a net outflow of earnings until around 2010; the change could be caused by a combination of the county becoming a more desirable place to live and a decrease in the amount of workers coming in from other counties. The gap between the inflow and outflow of earnings in Cache County has been narrowing due to job growth in the county attracting external workers. The amount of homes that are vacation residences could explain the strong net inflow of earnings into Rich County for more than 20 years. (EPS: Socioeconomic Measures, 2016)

Resilience

Normally resistant to the effects of national recessions and quick to recover, the Bear River region has rebounded only 1,650 new jobs since July of 2009, compared to the 4,228 jobs lost between December 2007 and June 2009. Despite this slower-than-expected recovery, the region's long term trend of economic growth continues. (EPS: Socioeconomic Measures, 2016)

Income Distribution



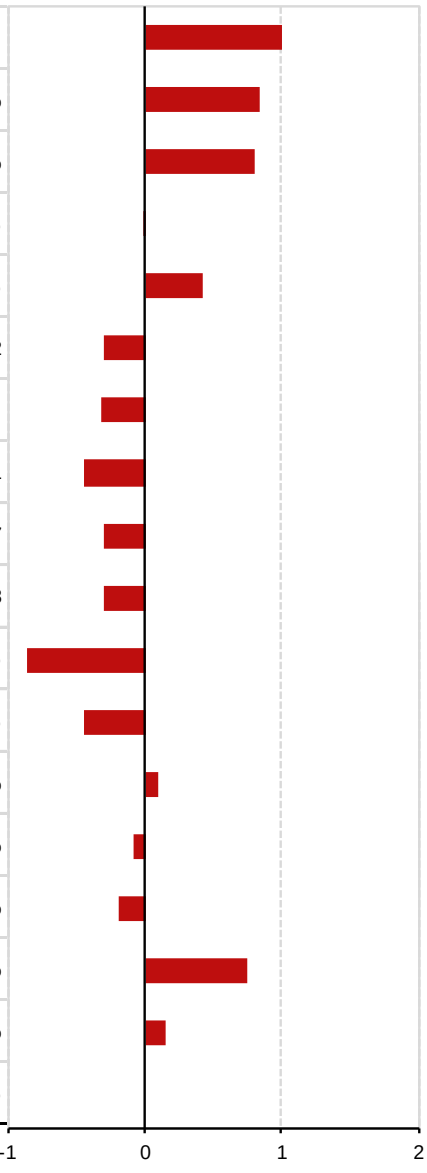
Data Sources: U.S. Department of Commerce. 2015. Census Bureau, American Community Survey Office, Washington, D.C.

In the 2009-2014 period, the bottom 40% of households in the Bear River Region accumulated approximately 14.8% of total income, and the top 20% of households accumulated approximately 50.3% of total income. The most common income bracket was $50,000 to $74,999, indicating a significant middle class. Public land managers must consider if any adverse effects of management actions will fall disproportionally on low income populations.

Regional Performance vs. U.S. Benchmarks

Relative Performance, 2014

		County Region	Benchmark: U.S.
Trend	Population (percent change, 2000-2014)	25.9%	13.0%
	Employment (percent change, 2000-2014)	22.7%	12.4%
	Personal Income (percent change, 2000-2014)	42.9%	23.7%
	Average Earnings per Job (percent change, 2000-2014)	3.7%	3.7%
	Per Capita Income (percent change, 2000-2014)	13.5%	9.5%
Prosper	Average Earnings per Job	$39,353	$57,022
	Per Capita Income	$31,108	$46,095
	Average Annual Wages - Services Related	$27,707	$49,431
	Average Annual Wages - Non-Services Related	$42,158	$60,317
	Average Annual Wages - Government Related	$36,142	$51,778
Stres	Unemployment Rate (change 2000-2014)	0.3%	2.2%
	Unemployment Rate	3.4%	6.2%
Structu	Percent of Employment in Proprietors	24.2%	22.0%
	Percent of Personal Income in Non-Labor	32.5%	35.8%
	Percent of Services Related Jobs	58.2%	72.1%
	Percent of Non-Services Related Jobs	26.3%	15.0%
	Percent of Government Jobs	14.8%	12.9%
	Commuting (net residential adjustment share of personal income)	4.2%	0.0%



Commuting statistics are displayed only when comparing a county to a benchmark county.

- County Region is most different from the U.S. in population (percent change, 2000-2014), unemployment rate (change 2000-2014), and employment (percent change, 2000-2014).

Data Sources: U.S. Department of Commerce. 2015. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C.; U.S. Department of Labor. 2015. Bureau of Labor Statistics, Local Area Unemployment Statistics, Washington, D.C.; U.S. Department of Labor. 2015. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.

Land Use

Land Ownership

Land Ownership (Acres)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Area	4,296,505	743,687	695,263	5,735,455	2,286,279,509
Private Lands	2,589,675	419,387	419,712	3,428,774	1,341,224,948
Conservation Easement	10,248	7,050	0	17,298	14,841,267
Federal Lands	1,424,257	285,692	223,332	1,933,281	658,155,051
Forest Service	103,933	285,639	52,192	441,764	193,059,372
BLM	1,074,934	53	171,140	1,246,127	253,918,202
National Park Service	2,665	0	0	2,665	78,818,664
Military	205,476	0	0	205,476	25,028,820
Other Federal	37,249	0	0	37,249	107,329,993
State Lands	282,573	38,607	52,219	373,399	192,517,204
State Trust Lands*	179,208	17,101	48,716	245,025	42,498,598
Other State	103,365	21,506	3,503	128,374	150,018,606
Tribal Lands	0	0	0	0	90,323,859
City, County, Other	0	0	0	0	4,058,428

Percent of Total

Private Lands	60.3%	56.4%	60.4%	59.8%	58.7%
Conservation Easement	0.2%	0.9%	0.0%	0.3%	0.6%
Federal Lands	33.1%	38.4%	32.1%	33.7%	28.8%
Forest Service	2.4%	38.4%	7.5%	7.7%	8.4%
BLM	25.0%	0.0%	24.6%	21.7%	11.1%
National Park Service	0.1%	0.0%	0.0%	0.0%	3.4%
Military	4.8%	0.0%	0.0%	3.6%	1.1%
Other Federal	0.9%	0.0%	0.0%	0.6%	4.7%
State Lands	6.6%	5.2%	7.5%	6.5%	8.4%
State Trust Lands*	4.2%	2.3%	7.0%	4.3%	1.9%
Other State	2.4%	2.9%	0.5%	2.2%	6.6%
Tribal Lands	0.0%	0.0%	0.0%	0.0%	4.0%
City, County, Other	0.0%	0.0%	0.0%	0.0%	0.2%

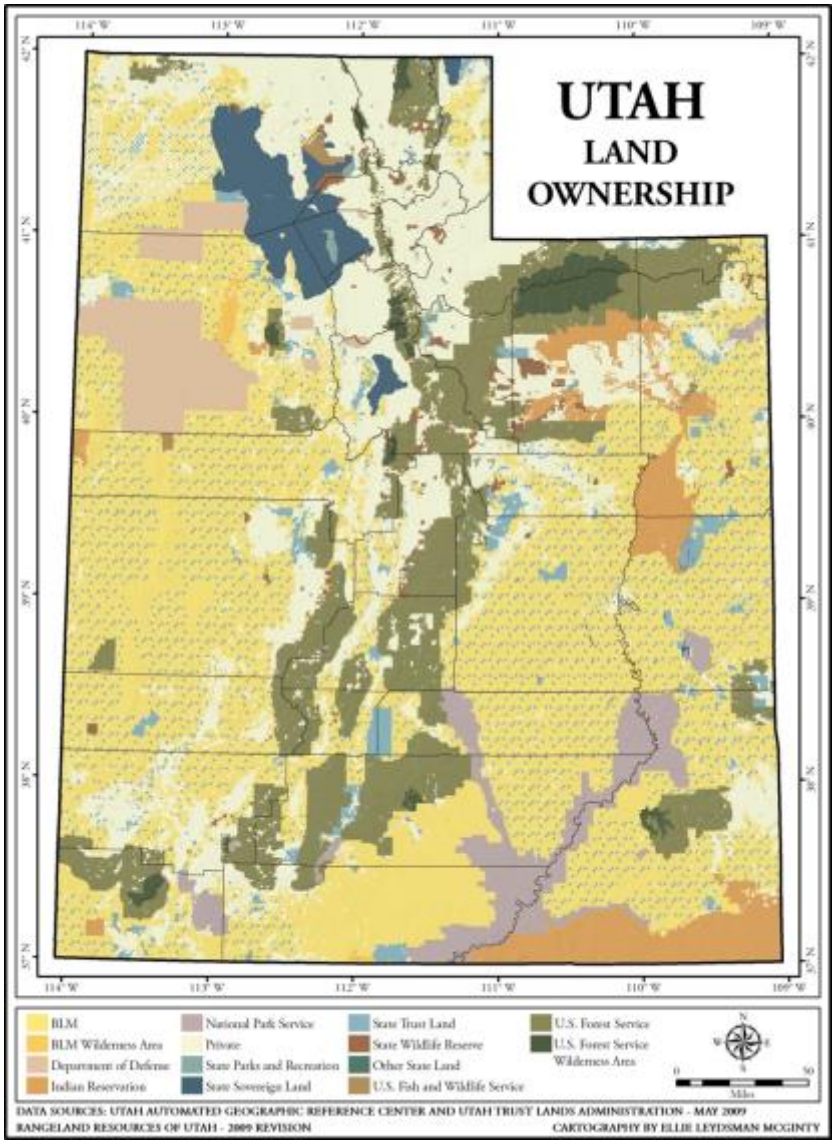
* Most state trust lands are held in trust for designated beneficiaries, principally public schools. Managers typically lease and sell these lands for a diverse range of uses to generate revenues for the beneficiaries.

Data Sources: U.S. Geological Survey, Gap Analysis Program. 2012. Protected Areas Database of the United States (PADUS) version 1.3

Box Elder County is the largest county at 4,296,505 acres. Rich has the largest share of private land at 60.4% and state land at 7.5%; Cache County has the largest share of federal land at 38.4% (almost all Forest Service). All three counties have a higher percentage of public land than the national average. Most of the federal land in Box Elder and Rich County is managed by the BLM. School and Institutional Trust Lands Administration (SITLA) lands are mostly scattered throughout the counties in 36 square mile parcels, except in areas where they have been consolidated by a land trade (http://platmap.trustlands.utah.gov). The share of public land in the region means that the decisions of Federal Land Managers may influence the local economy.

The percent of federal land in the region is slightly lower than the amount associated with peak migration and employment growth, however, Cache County is very near 37 percent of land as general-use federal land where peak income growth occurs. The portion of state lands in the region is also lower than the percentage that would be expected to contribute most to economic growth. (Transfer Study, 2014, p. 195)

Public federal lands are associated with economic growth up to about 40 or 45 percent of total land area within a county. A study conducted by researchers at The University of Utah, Utah State University, and Weber State University found that the federal land management agencies (FLMAs) spent an average of $8/acre on management costs in the state. (Transfer Study, 2014) This totals an estimated *$15,946,248 in management spending for the federal lands in the region.*



The Public Lands Transfer Study calculated the average per-acre revenue of Forest Service land in the state at $0.85 (including receipts and special collections) annually from 2008 to 2012. Statewide, recreation receipts and collections made up over half of the revenue. This computes to roughly $375,500 USFS revenue in the Bear River Region. Forest Service spending in the state averaged a much-higher $11.04 per acre, including wages and wildfire costs. Applying that to the regional acreage totals $4,877,075 regional Forest Service expenses.

The same study calculated an annual revenue of almost $14 per acre on BLM lands. Based on this estimate, BLM revenues in the region total $17,321,165, but they are probably lower due to the lack of extractive uses. Mean BLM spending per acre was $5.19 for FY2003-FY2012. This calculates an estimate of regional BLM expenses of $6,467,399.

Management Designations

Type A: National Parks and Preserves (NPS), Wilderness (NPS, FWS, FS, BLM), National Conservation Areas (BLM), National Monuments (NPS, FS, BLM), National Recreation Areas (NPS, FS, BLM), National Wild and Scenic Rivers (NPS, FS, BLM), Waterfowl Production Areas (FWS), Wildlife Management Areas (FWS), Research Natural Areas (FS, BLM), Areas of Critical Environmental Concern (BLM), and National Wildlife Refuges (FWS).

Type B: Wilderness Study Areas (NPS, FWS, FS, BLM), Inventoried Roadless Areas (FS).

Type C: Public Domain Lands (BLM), O&C Lands (BLM), National Forests and Grasslands (FS).

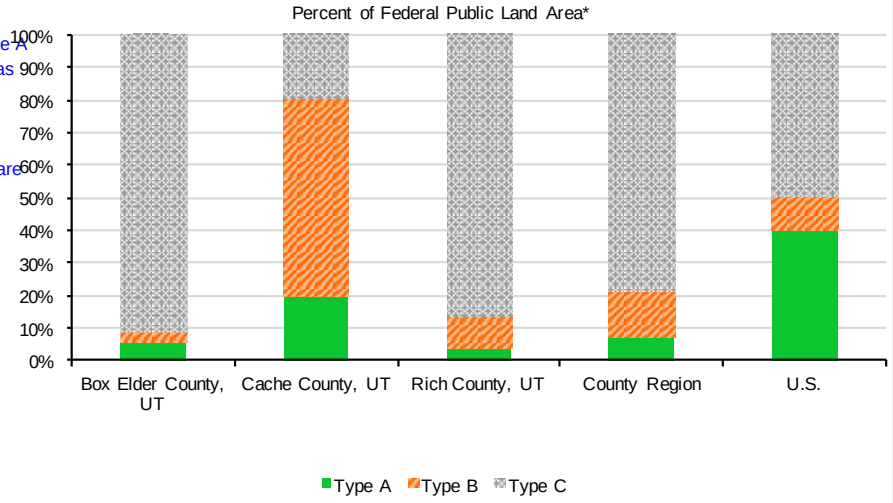
NPS = National Park Service; FS = Forest Service; BLM = Bureau of Land Management; FWS = Fish and Wildlife

Relative Management Designations of Federal Lands (Acres)*

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Area of Type A, B, and C	1,219,896	285,866	223,705	1,729,467	628,966,455
Type A	68,492	56,641	8,618	133,751	253,610,839
Type B	44,838	174,357	21,801	240,996	64,696,135
Type C	1,106,566	54,868	193,286	1,354,720	310,659,481
Percent of Total					
Type A	5.6%	19.8%	3.9%	7.7%	40.3%
Type B	3.7%	61.0%	9.7%	13.9%	10.3%
Type C	90.7%	19.2%	86.4%	78.3%	49.4%

* Year for data varies by geography and source. See data sources below for more information.

- The U.S. has the largest share of Type A land (40.3%), and Rich County, UT has the smallest (3.9%).
- Cache County, UT has the largest share of Type B land (61%), and Box Elder County, UT has the smallest (3.7%).
- Box Elder County, UT has the largest share of Type C land (90.7%), and Cache County, UT has the smallest (19.2%).



Data Sources: U.S. Geological Survey, Gap Analysis Program. 2012. Protected Areas Database of the United States (PADUS) version 1.3; Rasker, R. 2006. "An Exploration Into the Economic Impact of Industrial Development Versus Conservation on Western Public Lands." Society and Natural Resources. 19(3): 191-207.

Most of the federal land in the region is considered Type C, meaning it is open to grazing, resource development, and other consumptive uses. Consumptive uses may have more directly measurable economic impacts, but Type C areas might not attract as much recreation visitation.

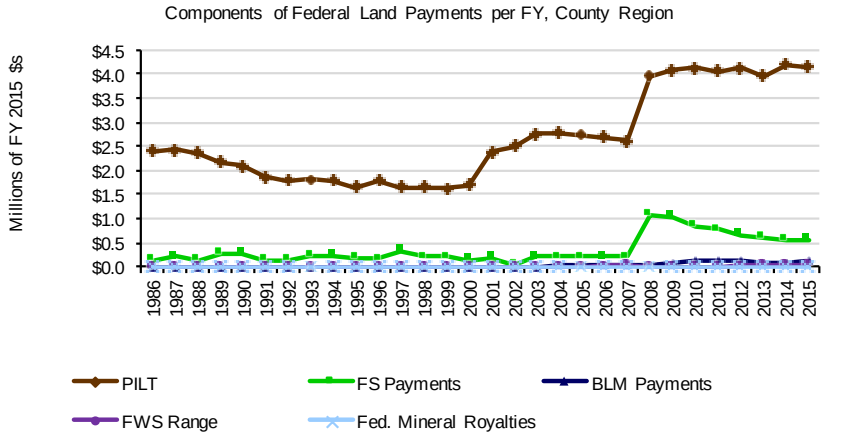
Federal Land Payments

Components

Components of Federal Land Payments to State and Local Governments by Geography of Origin, FY 2015 (FY 2015

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Federal Land Payments	3,271,179	1,083,406	479,914	4,834,499	2,619,597,406
PILT	3,060,328	692,377	393,083	4,145,788	439,017,406
Forest Service Payments	119,034	391,018	43,108	553,160	278,262,072
BLM Payments	55,896	12	43,723	99,631	50,042,624
USFWS Refuge Payments	35,921	0	0	35,921	17,381,146
Federal Mineral Royalties	0	0	0	0	1,834,894,159
Percent of Total					
PILT	93.6%	63.9%	81.9%	85.8%	16.8%
Forest Service Payments	3.6%	36.1%	9.0%	11.4%	10.6%
BLM Payments	1.7%	0.0%	9.1%	2.1%	1.9%
USFWS Refuge Payments	1.1%	0.0%	0.0%	0.7%	0.7%
Federal Mineral Royalties	0.0%	0.0%	0.0%	0.0%	70.0%

- From FY 1986 to FY 2015, Forest Service revenue sharing payments grew from $124,948 to $553,160, an increase of 343 percent.
- From FY 1986 to FY 2015, BLM revenue sharing payments grew from $0 to $99,631.



Data Sources: U.S. Department of Interior. 2016. Payments in Lieu of Taxes (PILT), , Washington, D.C.; U.S. Department of Agriculture. 2016. Forest Service, , Washington, D.C.; U.S. Department of Interior. 2016. Bureau of Land Management, , Washington, D.C.; U.S. Department of Interior. 2016. U.S. Fish and Wildlife Service, , Washington, D.C.; U.S. Department of Interior. 2016. Office of Natural Resources Revenue, , Washington, D.C.

Federal Land Payments compensate local governments for lost tax revenue on federally managed land.

Distribution

Distribution of Federal Land Payments to State and Local Governments by Geography of Origin, FY 2015 (FY 2015 $

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Federal Land Payments	3,271,179	1,083,406	479,914	4,834,499	2,619,597,406
State Government	0	0	0	0	1,835,168,554
County Government	3,165,305	885,942	414,637	4,465,884	631,126,857
Local School Districts	50,589	166,183	21,554	238,326	103,125,810
RACs	0	31,281	0	31,281	29,795,982
Grazing Districts	55,285	0	43,723	99,008	14,223,376
Percent of Total					
State Government	0.0%	0.0%	0.0%	0.0%	70.1%
County Government	96.8%	81.8%	86.4%	92.4%	24.1%
Local School Districts	1.5%	15.3%	4.5%	4.9%	3.9%
RACs	0.0%	2.9%	0.0%	0.6%	1.1%
Grazing Districts	1.7%	0.0%	9.1%	2.0%	0.5%

Data Sources: U.S. Department of Interior. 2016. Payments in Lieu of Taxes (PILT), , Washington, D.C.; U.S. Department of Agriculture. 2016. Forest Service, , Washington, D.C.; U.S. Department of Interior. 2016. Bureau of Land Management, , Washington, D.C.; U.S. Department of Interior. 2016. U.S. Fish and Wildlife Service, , Washington, D.C.; U.S. Department of Interior. 2016. Office of Natural Resources Revenue, , Washington, D.C.

The majority of Federal Land Payments are distributed to the county governments, followed by local school districts. While PILT (Payments in Lieu of Taxes) and SRS (Secure Rural Schools and Community Self-Determination Act) have decoupled local government payments from commercial activities on public lands, all the federal land payments delivered to state government (mineral royalties, BLM revenue sharing payments) are still linked directly to how public lands are managed.

Federal Land Payments make up 10.4% of total local government revenue in Box Elder County, 10.2% in Rich County, and only 2.3% in Cache County.

Allocation

Allocation of Federal Land Payments to County Government by Permitted Use, FY 2015 (FY 2015 $s)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Federal Land Payments	3,165,305	885,942	414,637	4,465,884	631,126,857
Unrestricted	3,096,351	692,379	393,083	4,181,813	486,377,597
Restricted-County Roads	50,589	166,183	21,554	238,326	130,089,946
Restricted-Special County Projects	17,855	27,371	0	45,226	14,383,926
Percent of Total					
Unrestricted	97.8%	78.2%	94.8%	93.6%	77.1%
Restricted-County Roads	1.6%	18.8%	5.2%	5.3%	20.6%
Restricted-Special County Projects	0.6%	3.1%	0.0%	1.0%	2.3%

Data Sources: U.S. Department of Interior. 2016. Payments in Lieu of Taxes (PILT), , Washington, D.C.; U.S. Department of Agriculture. 2016. Forest Service, , Washington, D.C.; U.S. Department of Interior. 2016. Bureau of Land Management, , Washington, D.C.; U.S. Department of Interior. 2016. U.S. Fish and Wildlife Service, , Washington, D.C.; U.S. Department of Interior. 2016. Office of Natural Resources Revenue, , Washington, D.C.

The majority (93.6%) of Federal Land Payments to the Bear River area county governments are unrestricted. The three Counties are responsible for maintaining roads that provide access to federal lands and are compensated a total of $238,326 annually.

PILT

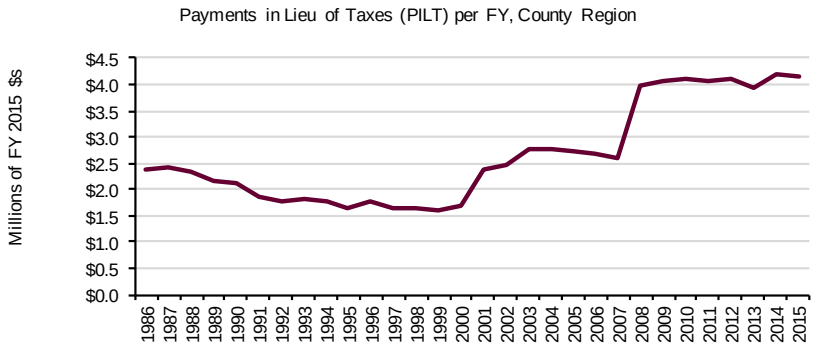
PILT Eligible Acres by Agency, FY 2015

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Eligible Acres	1,201,160	283,109	221,550	1,705,819	606,990,299
BLM	1,053,718	50	169,217	1,222,985	241,766,732
Forest Service	97,641	281,770	52,333	431,744	190,752,167
Bureau of Reclamation	4,789	1,289	0	6,078	3,945,389
National Park Service	1,569	0	0	1,569	76,885,869
Military	0	0	0	0	333,565
Army Corps of Engineers	0	0	0	0	8,047,787
U.S. Fish and Wildlife Service	43,443	0	0	43,443	85,235,272
Other Eligible Acres	0	0	0	0	23,518
PILT Payment (FY 2015 $s)	3,060,328	692,377	393,083	4,145,788	439,017,406
Avg. Per-Acre Payment (FY 2015 $s)	2.55	2.45	1.77	2.43	0.72

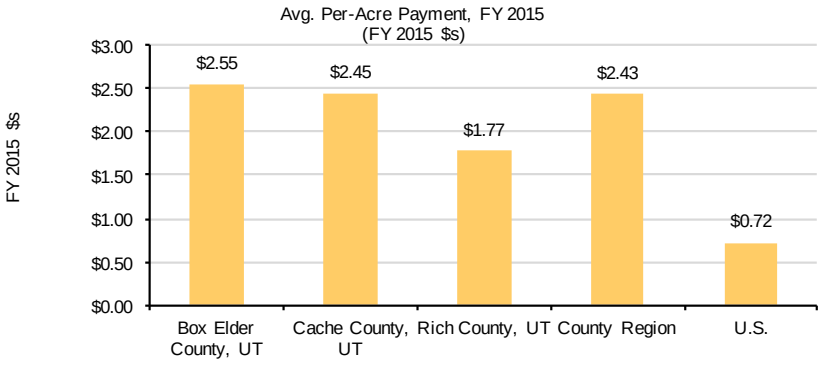
Percent of Total

BLM	87.7%	0.0%	76.4%	71.7%	39.8%
Forest Service	8.1%	99.5%	23.6%	25.3%	31.4%
Bureau of Reclamation	0.4%	0.5%	0.0%	0.4%	0.6%
National Park Service	0.1%	0.0%	0.0%	0.1%	12.7%
Military	0.0%	0.0%	0.0%	0.0%	0.1%
Army Corps of Engineers	0.0%	0.0%	0.0%	0.0%	1.3%
U.S. Fish and Wildlife Service	3.6%	0.0%	0.0%	2.5%	14.0%
Other Eligible Acres	0.0%	0.0%	0.0%	0.0%	0.0%

- From FY 1986 to FY 2015, PILT payments grew from $2,399,146 to $4,145,788, increased of 73 percent.



- In FY 2015, Box Elder County, UT had the highest average per-acre PILT payment ($2.55), and the U.S. had the lowest ($0.72).



Data Sources: U.S. Department of Interior. 2016. Payments in Lieu of Taxes (PILT), , Washington, D.C.

PILT payments are not restricted and are designed to stabilize county payments. PILT was typically not fully funded until FY 2008 when counties received a guarantee of five years at full payment amounts.

Regional PILT payments-per acre are higher than the national average. In 2012, the amount of PILT money that went to local school districts for each county was: Box Elder- $61,616; Cache- $163,971; Rich- $31,032.

Land Cover

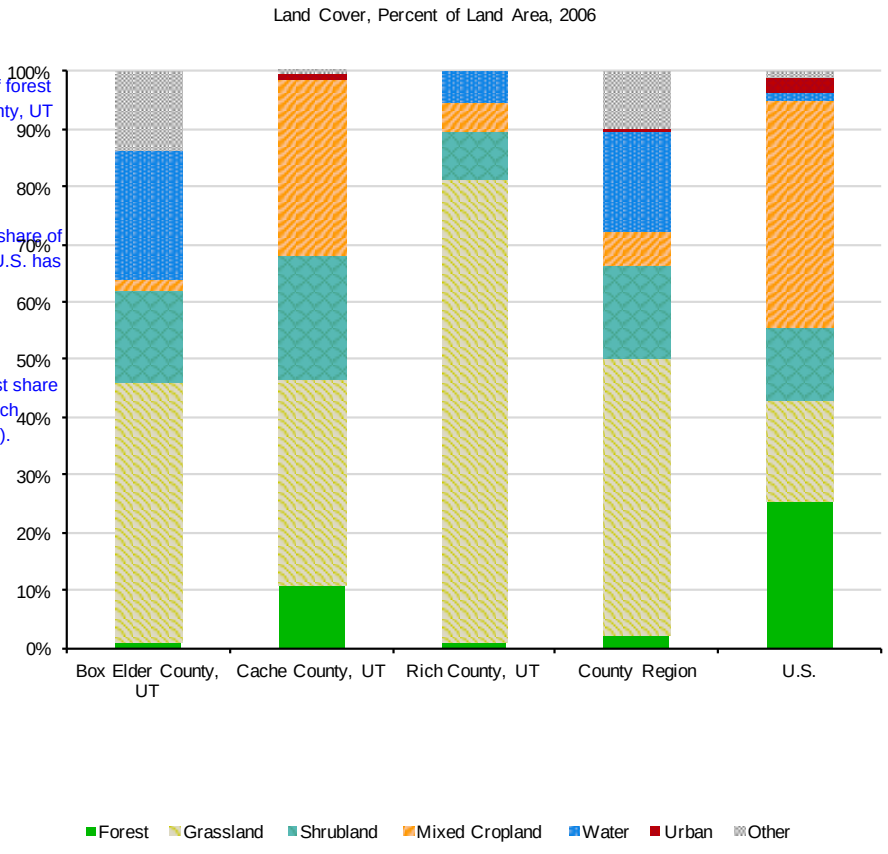
Land Cover (Acres), 2006

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Area	4,296,505	743,687	695,263	5,735,455	2,286,279,509
Forest	42,903	81,806	6,953	131,662	571,569,877
Grassland	1,890,462	260,290	549,258	2,700,010	388,667,517
Shrubland	687,441	156,174	55,621	899,236	274,353,541
Mixed Cropland	85,930	223,106	34,763	343,799	891,649,009
Water	945,231	981	34,763	980,975	22,862,795
Urban	1,726	7,437	0	9,163	68,588,385
Other	558,546	981	0	559,527	14,549,391

Percent of Total

Forest	1.0%	11.0%	1.0%	2.3%	25.0%
Grassland	44.0%	35.0%	79.0%	47.1%	17.0%
Shrubland	16.0%	21.0%	8.0%	15.7%	12.0%
Mixed Cropland	2.0%	30.0%	5.0%	6.0%	39.0%
Water	22.0%	0.1%	5.0%	17.1%	1.0%
Urban	0.0%	1.0%	0.0%	0.2%	3.0%
Other	13.0%	0.1%	0.0%	9.8%	0.6%

- The U.S. has the largest share of forest cover (25%), and Box Elder County, UT has the smallest (1%).
- Rich County, UT has the largest share of grassland cover (79%), and the U.S. has the smallest (17%).
- Cache County, UT has the largest share of shrubland cover (21%), and Rich County, UT has the smallest (8%).



Data Sources: NASA MODIS Land Cover Type Yearly L3 Global 1km MOD12Q1, 2006.

The region is 17.1% water, mostly in Willard Bay, The Great Salt Lake, and Bear Lake.

Residential Development

Residential Development 2000-2010

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Residential Acres 2000	29,227	41,844	5,997	77,068	190,918,648
Residential Acres 2010	36,577	53,624	10,096	100,297	214,475,717
Change in Res. Acres 2000-2010	7,350	11,780	4,099	23,229	23,557,069
Percent Change	25.1%	28.2%	68.4%	30.1%	12.3%
Residential Acres/Person, 2000	0.68	0.46	3.05	0.56	0.67
Residential Acres/Person, 2010	0.73	0.47	4.46	0.61	0.69
Change in Res. Ac./Person 2000-2010	0.05	0.02	1.41	0.04	0.02
Total Residential Units 2014*	17,756	38,200	2,872	58,828	132,741,033
Second Homes in 2014*	325	848	1,917	3,090	5,267,667
Percent Second Homes	1.8%	2.2%	66.7%	5.3%	4.0%

* The data in this table are calculated by ACS using annual surveys conducted during 2010-2014 and are representative of average characteristics during this period.

Data Sources: Theobald, DM. 2013. Land use classes for ICLUS/SERGoM v2013. Unpublished report, Colorado State University; U.S. Department of Commerce. 2015. Census Bureau, American Community Survey Office, Washington, D.C.

In addition to population growth, some demand for new development may be the result of migration of people drawn to the amenities of public lands. This is particularly likely in Rich County where 66.7% of residential structures are second homes.

Urban/Suburban: Average residential lot size < 1.7 acres.

Exurban: Average residential lot size 1.7 - 40 acres.

Total Residential: Cumulative acres of land developed at urban/suburban and exurban densities.

Residential Development (Acres), 2000-2010

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S
Total Private Land	2,589,675	419,387	419,712	3,428,774	1,341,224,948
Total Residential, 2000	29,227	41,844	5,997	77,068	190,918,648
Urban/Suburban, 2000	4,816	9,840	675	15,331	31,001,465
Exurban, 2000	24,410	32,004	5,322	61,736	159,917,167
Total Residential, 2010	36,577	53,624	10,096	100,297	214,475,717
Urban/Suburban, 2010	6,303	12,664	971	19,938	37,816,640
Exurban, 2010	30,274	40,960	9,125	80,359	176,659,056
Percent Change in Total Residential	25.1%	28.2%	68.4%	30.1%	12.3%
Percent of Total*					
Total Residential, 2000	1.1%	10.0%	1.4%	2.2%	14.2%
Urban/Suburban, 2000	0.2%	2.3%	0.2%	0.4%	2.3%
Exurban, 2000	0.9%	7.6%	1.3%	1.8%	11.9%
Total Residential, 2010	1.4%	12.8%	2.4%	2.9%	16.0%
Urban/Suburban, 2010	0.2%	3.0%	0.2%	0.6%	2.8%
Exurban, 2010	1.2%	9.8%	2.2%	2.3%	13.2%

* The percentages in this table represent the percent of private land developed at various housing densities, and should not sum to 100%.

Data Sources: Theobald, DM. 2013. Land use classes for ICLUS/SERGoM v2013. Unpublished report, Colorado State University; U.S. Department of Commerce. 2015. Census Bureau, American Community Survey Office, Washington, D.C.

The faster growth of exurban development (a 0.5% change in residential land from 2000 to 2010, compared to a 0.2% change for urban/suburban land) illustrates the recent popularity of multi-acre lots

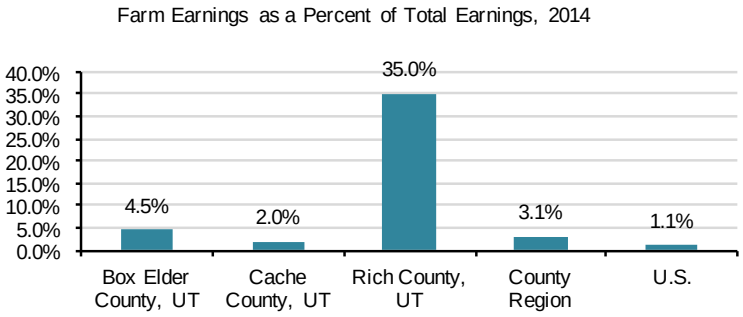
and rural residences. Cache County has the least residential acres/person in 2010 at 0.47 and Rich County has the most at 4.46. Box elder had 0.73 and the national average was 0.69 residential acres/person. The averages in all three counties have risen, meaning land consumption is outpacing population growth. Residential acres/person have risen most quickly in Rich County, due to the development of large-lot vacation homes.

Farming

(Livestock & Grazing + Agriculture)

Farm Earnings

- In 2014, Rich County, UT had the largest percent of total earnings from farm earnings (35.03%), and U.S. had the smallest (1.06%).



Data Sources: U.S. Department of Commerce. 2014. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C.

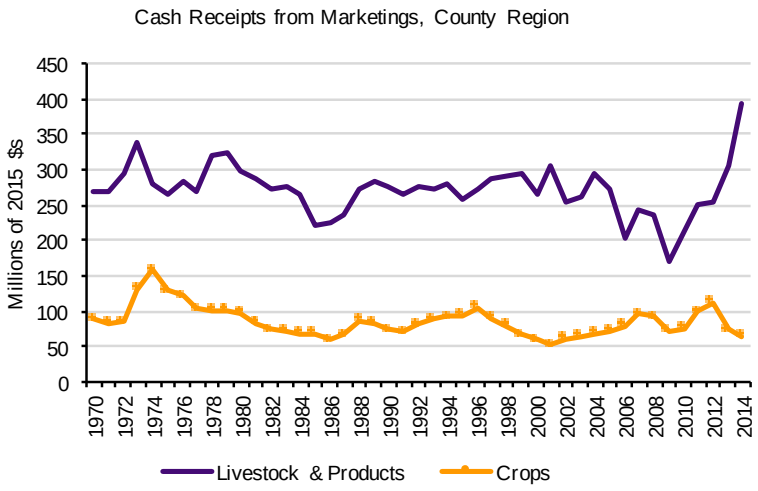
Each county has a larger economic contribution from farming than the average U.S. county. Recent farm earnings data in Rich County has been inconsistent, so the percent of total earnings may not be accurate, however, it is probably higher than the other counties.

Farm Income

Farm Business Income, 2014 (Thousands of 2015 $s)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Cash Receipts & Other Inc. ($1000)	233,822	205,290	63,388	502,500	473,140,991
Cash Receipts from Marketing	205,598	194,468	57,025	457,092	428,891,959
Livestock & Products	171,156	167,945	53,112	392,213	233,820,408
Crops	34,442	26,523	3,913	64,879	195,071,552
Other Income	28,223	10,822	6,363	45,408	44,249,032
Government Payments	12,906	2,549	3,501	18,956	9,776,617
Imputed Rent & Misc. Income	15,317	8,273	2,862	26,452	34,472,415
Total Production Expenses	194,274	157,127	41,819	393,220	394,323,065
Realized Net Income (Receipts - Expenses)	39,548	48,163	21,570	109,280	78,817,927
Value of Inventory Change	-4,270	-2,365	-2,495	-9,131	14,212,746
Total Net Income Including Corp. Farms	35,277	45,798	19,074	100,149	93,030,673
Ratio: Total Cash Receipts & Other Income/Total Production Expenses	1.20	1.31	1.52	1.28	1.20

- From 1970 to 2014, cash receipts from livestock and products grew from $267.5 million to $392.2 million, a 46.6 percent increase.
- From 1970 to 2014, cash receipts from crops shrank from $89.5 million to $64.9 million, a 27.5 percent decrease.



Data Sources: U.S. Department of Commerce. 2014. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C.

Farm revenue has remained relatively steady over time, with a long-term trend of slow decline. Livestock and products sales values have seen a spike in all three counties since 2010. Livestock production has traditionally been the prevailing farming sector in the Bear River region. According to the Economic Report to the Governor, Box Elder and Cache Counties are among the top five counties in the state in terms of agricultural sales value. (Utah Economic Council, 2016)

Employment

Farm jobs, including livestock, accounted for 11.2% of employment in Rich County, 5.7% in Box Elder County, and 2.1% in Cache County. Since 1970, the number of farming jobs in the region has declined by roughly 30%, on par with the national average. (EPS: Agriculture, 2016)

Farm Wages

Average Annual Wages, 2014 (2015 $s)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Private & Public	$34,847	$33,055	$25,376	$33,439	$51,361
Total Private	$35,448	$32,035	$21,779	$32,855	$51,295
Farm	$24,985	$26,959	$30,095	$26,078	$30,674
Crop Production	$22,528	$28,424	$0	$23,622	$29,221
Animal Production	$27,952	$26,684	$30,095	$27,434	$33,968
Non-Farm	$31,614	$31,806	~$21,810	~$31,722	$51,439

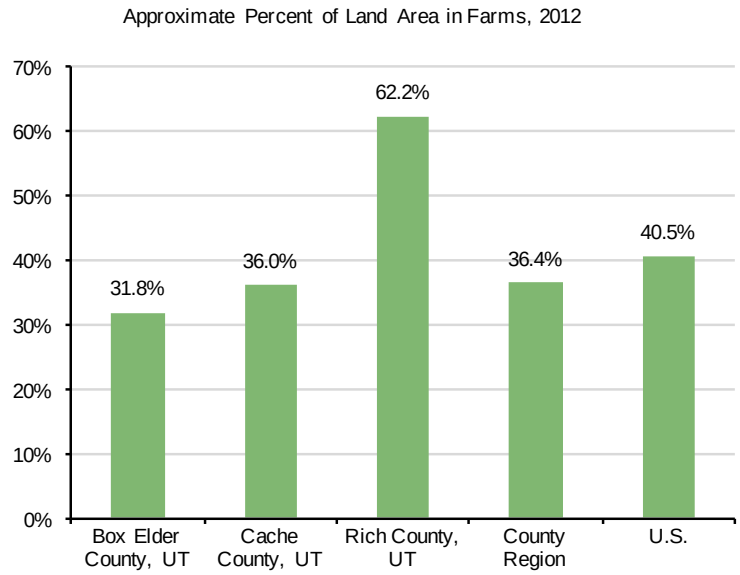
This table shows wage data from the Bureau of Labor Statistics, which does not report data for proprietors or the value of benefits and uses slightly different industry categories than those shown on previous pages of this report.

Data Sources: U.S. Department of Labor. 2015. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.

Average farm wages were highest in Rich County, but still slightly below the national average. The average animal production worker made almost $4,000 more than the average crop farmer in 2014. Adjusted crop and animal production wages have remained steady for the last 20 years.

Farm Land Area

- In 2012, Rich County, UT had the largest percent of land area in farms (62.2%), and Box Elder County, UT had the smallest (31.8%).



Land in Farms According to Use (Acres), 2012

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Land in Farms	1,170,736	268,511	409,359	1,848,606	914,527,657
Cropland	328,644	137,212	77,152	543,008	389,690,414
Woodland	5,083	4,910	1,549	11,542	77,012,907
Land in Farmsteads & Buildings	31,055	16,552	4,002	51,609	32,515,057
Permanent Pasture & Rangeland	805,954	109,837	326,656	1,242,447	415,309,280

Percent of Total

Cropland	28.1%	51.1%	18.8%	29.4%	42.6%
Woodland	0.4%	1.8%	0.4%	0.6%	8.4%
Land in Farmsteads & Buildings	2.7%	6.2%	1.0%	2.8%	3.6%
Permanent Pasture & Rangeland	68.8%	40.9%	79.8%	67.2%	45.4%

Data Sources: U.S. Department of Agriculture. 2014. National Agricultural Statistics Service, Census of Agriculture, Washington, D.C.

Cropland covers more area than pasture and rangeland in Cache County, although livestock produces more in terms of sales value. Animal products are generally more expensive than crops and some livestock production is on leased public land. Agricultural land use is usually proportionally larger than its economic contributions.

Farm Types

Number of Farms by Type, 2012

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
All Farms	1,235	1,217	158	2,610	2,109,303
Oilseed & Grain Farming	133	82	0	215	369,332
Vegetable & Melon Farming	28	19	0	47	43,021
Fruit & Nut Tree Farming	62	16	3	81	93,020
Greenhouse, Nursery, etc.	12	18	0	30	52,777
Other Crop Farming	409	496	43	948	496,837
Beef Cattle Ranch. & Farm.	312	277	85	674	619,172
Cattle Feedlots	13	4	5	22	13,734
Dairy Cattle & Milk Prod.	25	83	0	108	46,005
Hog & Pig Farming	8	8	0	16	21,687
Poultry & Egg Production	11	5	0	16	52,849
Sheep & Goat Farming	37	26	6	69	73,272
Animal Aquaculture & Other Animal Prod.	185	183	16	384	227,597

Percent of Total

Oilseed & Grain Farming	10.8%	6.7%	0.0%	8.2%	17.5%
Vegetable & Melon Farming	2.3%	1.6%	0.0%	1.8%	2.0%
Fruit & Nut Tree Farming	5.0%	1.3%	1.9%	3.1%	4.4%
Greenhouse, Nursery, etc.	1.0%	1.5%	0.0%	1.1%	2.5%
Other Crop Farming	33.1%	40.8%	27.2%	36.3%	23.6%
Beef Cattle Ranch. & Farm.	25.3%	22.8%	53.8%	25.8%	29.4%
Cattle Feedlots	1.1%	0.3%	3.2%	0.8%	0.7%
Dairy Cattle & Milk Prod.	2.0%	6.8%	0.0%	4.1%	2.2%
Hog & Pig Farming	0.6%	0.7%	0.0%	0.6%	1.0%
Poultry & Egg Production	0.9%	0.4%	0.0%	0.6%	2.5%
Sheep & Goat Farming	3.0%	2.1%	3.8%	2.6%	3.5%
Aquaculture & Other Prod.	15.0%	15.0%	10.1%	14.7%	10.8%

Data Sources: U.S. Department of Agriculture. 2014. National Agricultural Statistics Service, Census of Agriculture, Washington, D.C.

Other crop farming and beef cattle ranching are the most common farm types in the region. Cache County produces the most dairy productions.

Dollar Sales by Type, 2012 (in $1,000s)

	Box Elder	Cache	Rich
Sales of Animals and Animal Products	93,230	105,342	28,352
Milk	39,628	55,250	15
Cattle, including calves	43,990	22,374	27,537
Sheep	4,734	138	706
Crop Sales	76,316	37,542	4,473
Fruit and Tree Nut	2,673	396	22
Vegetables	3,482	382	?
Grain	38,253	?	141

(NASS, 2012)

Cattle sales made the biggest economic contribution from farming in Box Elder and Rich County. Milk product sales had the highest value in Cache County. Grains are the largest crop in terms of sales in Box Elder County. Sales are up from 2007 for animals in Box Elder and Rich County, and for crops in all three counties. Cache County saw a decline in animal and animal product sales value from 2007 to 2012. These figures differ slightly than previous data used in this report because they are from the U.S. Department of Agriculture, National Agricultural Statistics Service, rather than the Department of Commerce, Bureau of Economic Analysis.

Grazing on Federal Lands

The U.S. Department of Agriculture (USDA) - National Agricultural Statistics Service's (NASS) Utah Western Production Region includes the counties of Box Elder, Tooele, Cache, Rich, Weber, Morgan, Davis, Salt Lake, Utah, Juab, Millard, Sanpete and Sevier, and tracks grazing on BLM and Forest Service Land. Ranchers in the Western region totaled $31,484,300 in expenses and $41,776,300 in ranchers' cash receipts, resulting in a net income of $10,292,000. Most of the ranchers' expenses came in the form of feed purchases. Federal land grazing contributed to 1,188 direct and indirect jobs, $30,213,658 in wages, and $40,728,883 to the gross regional product (GRP) in the Western region. It also created $2,182,737 in state and local taxes. (Transfer Study, 2014, p. 339) The disbursement of grazing fees in the Northwest Region (Box Elder, Cache, and Rich Counties) was $11,719 in 2013, lower than the ten-year average of over $20,000 annually. (Transfer Study, 2014, p. 233)

During the summer months, about half of grazing in Box Elder County is on public lands, while the other half is on private ranches. Grazing on public lands becomes more common during the fall and spring (around 70% of total grazing). In the winter ranchers are mostly dependent on hay to feed their herds. (Holmgren & Pace, 2012) In 2007, 47% of feeding was done on federal land during grazing seasons in Cache and Rich Counties (by livestock operators with grazing permits). (Godfrey, 2008)

Fire Management

Wildfire-related expenditures on Forest Service Land averaged $4.48 per acre in Utah for FY2008-FY2012. *This totals $1,979,103 in annual wildfire expenses in the Bear River Region*. Per acre wildfire spending for the BLM averaged $1.76, totaling *$2,193,184 in the region*. The Utah Division of Forestry, Fire, and State Lands (FFSL) spends an estimated $1,672,956 on the 3.8 million acres of state and private land in the region per year. These estimates are based on statewide averages, and can be highly volatile depending on the number and size of fires in the region. More than half of the BLM's wildfire spending is on non-suppression activities such as prevention. Utah FFSL spends almost 80% of its wildfire budget on suppression, while the Forest Service is almost split down the middle. Each agency spent around 30% of its total annual expenditures on wildfire efforts. Wildfire expenses include suppression, mitigation, restoration, and prescribed burns. (Transfer Study, 2014, p. 506)

As of 2005, an estimated 77 percent of Utah's timberland was stocked in excess of prescribed conditions. In a study from 2000, the cost of prescribed burns in the national forests of the West was $124 per acre (in 2013 dollars). Other methods of excess fuel removal were more costly.

Drought, beetles, noxious weeds, and certain forest management strategies all contribute to increased wildfire risk. In a region that includes Utah, the majority of wildfires were ignited by natural causes, such as lightning; humans started about 1/5 of the recorded wildfires. Statewide, almost 35 percent of the direct land management cost is for wildfire. From FY2003 to FY2012, wildfire-related expenditures in Utah averaged $85.6 million annually, in 2013 dollars. The USFS and BLM bore the majority of these costs (91.7%). Fire suppression was the most unpredictable component, and made up almost 40% of wildfire costs. (Transfer Study, 2014, p. 494)

For FY2003-FY2012, Utah wildfires on BLM land averaged 254 acres per fire and suppression costs were $80 per acre burned. Large fires can be even more costly, both in total and per acre. (Transfer Study, 2014, p. 25)

Wildland-Urban Interface

Wildland-Urban Interface (Square Miles), 2010

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	West
Total WUI Area	13	10	1	24	23,596
WUI Area with Homes	0	1	0	1	3,837
WUI Area without Homes	13	9	1	23	19,759
Percent of Total					
WUI Area with Homes	0.0%	10.0%	0.0%	4.2%	16.3%
WUI Area without Homes	100.0%	90.0%	100.0%	95.8%	83.7%

Data Sources: Gude, P.H., Rasker, R., and van den Noort, J. 2008. Potential for Future Development on Fire-Prone Lands. Journal of Forestry 106(4):198-205; U.S. Department of Commerce. 2011. TIGER/Line 2010 Census Blocks and 2010 Summary File 1, Washington, D.C.

The growing number of homes built in the Wildland-Urban Interface is a contributing factor in the escalating cost of wildland firefighting in the West. With a median home value of $221,600 in Cache County, wildfire costs can rise dramatically if any houses are damaged or destroyed (City-Data.com, 2016). Wildfire risk may affect insurance rates for homes built in the WUI. The amount of WUI area with homes in the Bear River Region is relatively low, but there is potential for future development. It will be important for developers to take wildfire risk into account when building new homes.

Total Homes and Wildland-Urban Interface Homes, 2010

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	West
Total Number of Homes	17,326	37,024	2,834	57,184	27,766,144
WUI Homes	118	675	189	982	1,947,927
Second Homes in WUI	2	144	169	315	293,196
Percent of Total					
WUI Homes as % of Total Homes	0.7%	1.8%	6.7%	1.7%	7.0%
Second Homes as % of WUI Homes	1.7%	21.3%	89.4%	32.1%	15.1%

Data Sources: Gude, P.H., Rasker, R., and van den Noort, J. 2008. Potential for Future Development on Fire-Prone Lands. Journal of Forestry 106(4):198-205; U.S. Department of Commerce. 2011. TIGER/Line 2010 Census Blocks and 2010 Summary File 1, Washington, D.C.

Rich County has the highest percent of WUI homes, and also the highest percent of WUI homes that are second homes. It is important to assess the portion of WUI homes that are second homes during a fire because of the monetary costs and risked lives associated with protecting them. How much should land managers be willing to risk for homes that are not primary residences?

Noxious Weeds + Invasive Species

According to GIS data, a total of 19,887 acres of land in Cache County are affected by invasive plants. This value may include some overlap of acres that are affected by multiple invasive plants, as the maximum value from an individual survey was 8,974 acres. Box Elder County showed 2,257 affected acres, and Rich county had 1,876. A total of 0.42% of land in the region was reported to contain noxious weeds.

Noxious weeds are, by definition, harmful and associated with negative economic impacts. Nationwide, annual economic losses from weeds exceed $20 billion. Weeds reduce crop yields, damage watersheds, increase soil erosion, negatively affect native plants and animals, and adversely affect outdoor recreation. Many invasive weeds increase wildfire risks by providing additional fuel.

Class A weeds are considered high priority and pose a serious threat to affected regions. All 12 Class A weeds in Utah have been found in at least one of the counties in the region. Every Class B and Class C weed in the state can be found in the region as well. The management strategies for Class B and C weeds are control and containment, respectively. (Belliston et. al., 2009)

Chemical, ecological, and biological methods of weed control can be a significant expense for farmers and other land owners/managers. If crops are not kept weed-free in the four to six weeks after planting, it can result in a yield loss of 7-16% for various crops. A BLM study found a reduction in grazing of 38-90% for lands infested with different types of noxious weed. Based on the percent of land affected by invasive weeds, $625,972 to $1,482,565 in livestock revenue is lost each year due to noxious weeds in the region. This estimated is limited because the estimate for land affected by weeds is based on total land mass, not grazing land. It is also taking a percent of current revenue, which would already be missing the potential revenue lost to weeds (Whitesides, 2004)

The cost to control all invasive species is estimated at an annual $137 billion in the U.S. Non-weed invasive species in Utah include bullfrogs and various mammals. An area of particular economic concern is aquatic invasive species: namely quagga and zebra mussels. Aquatic invasive species can deteriorate fisheries by filtering out nutrients and outcompeting native animals. (UT NRCS, 2011) To stop the spread of quagga mussels, the Utah Division of Wildlife Resources' Aquatic Invasive Species program educates boaters and anglers, and also provides free decontaminations to boats who have been to affected waters. The FY2013 budget for the program included $1,350,000 in Utah General Funds, and $325,256 in partner funds. Decontamination units are located at Willard Bay, Hyrum, and Bear Lake

State Parks, and state personnel monitor watercraft on water bodies throughout the region. (Dalton, 2012)

Mining

Although the U.S. Geologic Survey ranks the value of Utah's 2014 mineral production fifth nationally, mining is not an important factor in the regional economy. Fuels and mineral mining and supporting services contributed only 36 (approximate) jobs to the region (less than 0.1% of total employment). Approximately 22 people in Box Elder County work in mining; only two mining jobs were reported in Rich County. Mining wages averaged $45,756 annually in the region. Northern Utah does not have a lot of history or potential growth in mining production. (EPS: Mining, 2016)

Taxable mining sales in the counties reported by the Utah State Tax Commission were highly variable for the decade between 2003 and 2013. In 2013 they were $3,937,512 in Box Elder County, $600,000 for Cache County, and $150,000 in Rich County. These sales led to estimated county revenues from taxing mining sales of $116,780; $218,400; and $5,091; respectively. (Transfer Study, 2014, p. 247)

Taxable value of fuel and mineral resources as assessed by the Utah State Tax Commission in 2013:

County	Metal Mines	Oil and Gas Extraction	Sand and Gravel	Non-Metal Mines	Total Natural Resources	NR Property Taxes
Box Elder	$283,224	$10,499	$79,320,261	$66,334,556	$145,948,560	$1,834,571
Cache	$97,354		$9,096,196		$9,193,550	$87,440
Rich		$14,600	$292,990	$242,511	$550,101	$4,416

(Transfer Study, 2014, p. 251)

Box Elder County has the highest value of subterranean resources at almost $146 million. To compare, Uinta and Salt Lake County each have a taxable natural resource value of over $2 billion. These figures include all minable materials, not just existing mines.

Mineral Resources

Nonmetallic minerals mining employed approximately 21 people in Box Elder County and 1 in both Cache and Rich County. (see Mining)

No Federal Mineral Royalties were paid to the area's local governments in 2015 (see Federal Land Payments under Land Use). The Utah Department of Transportation (UDOT) paid small mineral lease sums to Rich and Box Elder Counties in some years from FY2003 to FY 2012; Cache County has not received any mineral lease money from UDOT in recent years.

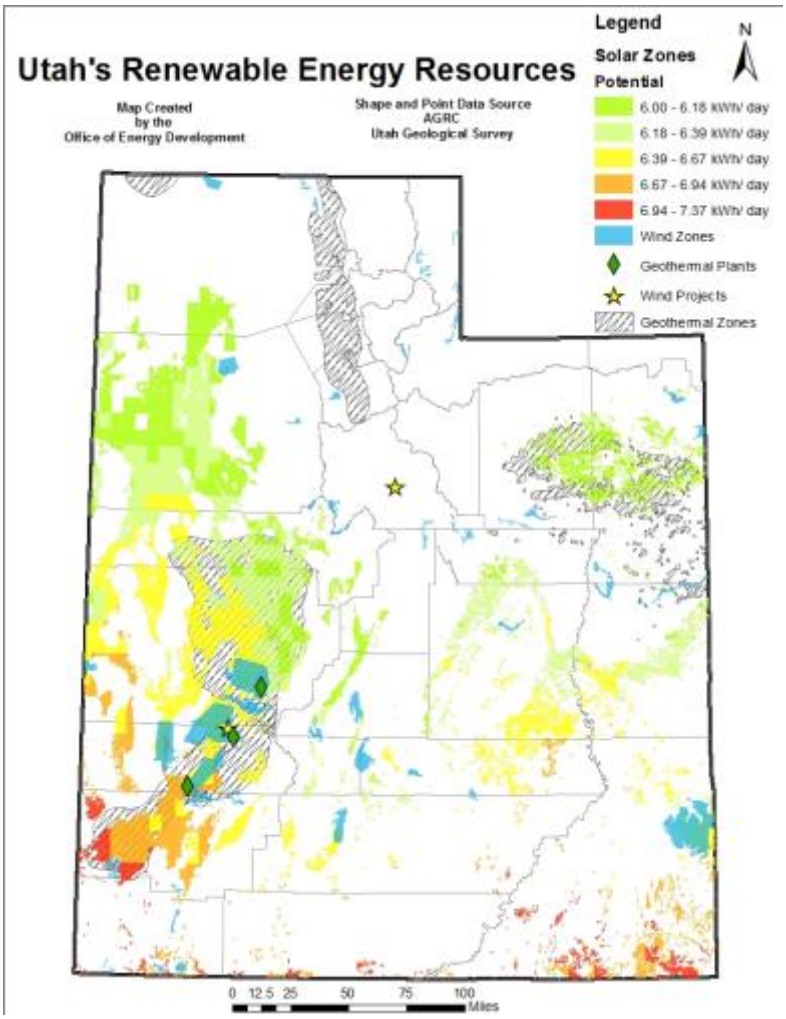
Energy Resources

Oil and Gas

Oil and gas extraction employed approximately 11 people in Cache County in 2013, mostly in support positions. No oil and gas jobs were reported in Rich or Box Elder County. (see Mining) Rich and Box Elder Counties do have some land in BLM oil and gas deferrals. (Transfer Study, 2014, p. 35)

Renewable Energy

In 2013, Utah generated a total of 1,577 Gigawatt hours of electricity using renewable sources. This was down 15% from 2012 but up 150% from 2003. Hydro plants were the largest renewable electricity producer, although wind, geothermal, and biomass have been gaining momentum. Population growth and dwindling coal reserves are contributing to an increased demand for renewable energy in Utah.



As seen on the renewable energy resources state map, Box Elder County has the most potential for renewable energy development. Solar, geothermal, and wind power production may be feasible in different parts of the county. A few wind zones are present in Rich County, but no renewable energy resources are shown for Cache County. Wind turbines could be an additional source of income for agricultural producers and others with abundant land. There is also action in the biofuel industry in Box Elder County. (Governor's Office of Energy Development, 2016)

Box Elder County has the potential for the production of 570 megawatts of wind production and 48 MW of geothermal production in the Ben Lomond and Cedar Creek renewable energy zones. The Birch Creek Zone in Rich County has 405 MW of wind potential. (Transfer Study, 2014, p. 469)

A 2006 study estimated the construction costs of a supposed 30 megawatt wind plant in Box Elder County at $39 million (2005 dollars). Property taxes for the plant would be approximately $377,000; with $248,000 going to local schools. Annual operating costs would be about $343,500. The facility would generate $273,400 in annual salaries and benefits. Total annual economic output was estimated

at $313,000 during construction, and more than $640,000 once the facility was operational. (Hartman, 2006) The new Cache Solar Discount Program incentivizes rooftop solar installation in Northern Utah.

The economic benefits of renewable energy development can come from its direct environmental impacts as well as its contribution of high-paying, skilled jobs and salaries. The spending of these individuals spurs the rest of the economy. Depending on the costs and subsidies of renewable energy production, renewable energy may cost consumers more or less than electricity produced by other sources. Currently, Rocky Mountain Power customers can buy 100-killowhat-hour blocks of wind power generated outside of the state for $1.95 per month, in addition to the regular utility rates.

Forest Management

Timber Employment

Employment in Timber, 2014

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Private Employment	16,753	39,326	389	56,468	121,079,879
Timber	~263	~126	0	~389	796,080
Growing & Harvesting	0	0	0	0	64,674
Forestry & Logging	0	0	0	0	54,183
Support Activities for Forestry	0	0	0	0	10,491
Sawmills & Paper Mills	~179	0	0	~179	254,837
Sawmills & Wood Preservation	0	0	0	0	79,898
Pulp, Paper, & Paperboard Mills	~165	0	0	~165	106,618
Veneer, Plywood, & Engineered Wood	~14	0	0	~14	68,321
Wood Products Manufacturing	~84	~126	0	~210	476,569
Other Wood Product Mfg.	~17	95	0	~112	217,183
Converted Paper Product Mfg.	~67	~31	0	~98	245,358
Non-Timber	~16,490	~39,200	0	~55,690	120,283,799

Data Sources: U.S. Department of Commerce. 2016. Census Bureau, County Business Patterns, Washington, D.C.

The Bear River region employs an estimated 389 people in timber related industries (0.7% of total private employment). The majority of these jobs are in paper mills and manufacturing; there were no reported growing and harvesting jobs in the region. Box Elder County has the most timber-related (manufacturing) jobs at 263, and has seen significant growth since 2009, while timber jobs in Cache County have declined over time. Cache County had four sawmills in 2002.

Timber Wages

Average Annual Wages, 2014 (2015 $s)

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S
All Sectors	$34,882	$33,088	$25,402	$33,472	$51,413
Private	$35,484	$32,067	$21,801	$32,887	$51,346
Timber	$33,263	$27,977	$0	$30,216	$51,447
Forestry & Logging	$0	$0	$0	$0	$42,352
Wood Products Manufacturing	$33,263	$27,977	$0	$30,216	$40,103
Paper Manufacturing	na	$0	$0	$0	$64,114
Non-Timber	$31,369	$31,807	$23,085	$31,671	$51,345
Government	$31,503	$37,504	$34,393	$36,142	$51,778

This table shows wage data from the Bureau of Labor Statistics, which does not report data for proprietors or the value of benefits and uses slightly different industry categories than those shown on previous pages of this report.

Data Sources: U.S. Department of Labor. 2015. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.

Timber-related jobs paid slightly less than the average private sector job in 2014.

Timber Harvest

The only Bear River county that reported that reported a timber harvest on USFS land in 2007 was Cache at 1,150,000 board feet, 3.8% of the state total. In 2002, Rich County reported 3,000 board feet but no timber harvest was reported in 2007. No harvest was reported either year in Box Elder County. (Transfer Study, 2014, p. 347) Douglas-fir sold for an average of $245.51 per thousand board feet in 2008, totaling an estimated production value of $283,073 in the region, assuming production came from the region's Douglas-fir forests. (Forest Service, 2009, p. 11)

The Utah Division of Forestry, Fire, and State Lands received 12 notifications of intent to harvest or perform other services from forest operators on state and private land in the Bear River Region from 2002 to 2012. (Transfer Study, 2014, p. 365)

Cache was a leading county in the state for Douglas-fir forests. More information about the types and number of forest in each county are available in the Transfer of Federal Lands Study on page 480. In Cache County, 87% of the 147,305 acres of timberland is on federal land, and the rest is on private land. In Box Elder County, 60% of the 16,458 acres of timberland are on private land, with the rest on federally managed land. Rich County has 72,641 acres of timberland with 63% on federal land, 2% on state land, and 35% on private land. The timber resources in the region must be managed for the benefit of the citizens of each county.

For non-timber uses in forests on federal land, see Land Use or Recreation and Tourism.

Water

Irrigation + Ditches & Canals

About 5.2 million acre-feet of water is annually diverted in the state, with 82 percent going to agricultural uses, and the rest to home, business, and other uses. The costs of supplying water are currently funded by user fees and general taxes. The use of sales and property taxes to help fund water distribution is controversial. Water-related conservancy, improvement, and other local districts imposed nearly $120 million in property taxes statewide in FY2012. To promote water conservation, 93 percent of drinking water systems have a rate structure where prices increase with usage.

Cost estimates from a USU Extension report indicate that irrigation costs make up between 7.7 and 8.4 percent of total production costs for hay and grain production. Alfalfa and grain production may be more water-intensive than other agricultural uses in the region, such as livestock. Regardless, a portion of the $393,220,000 annual agricultural production expenses in the region can be attributed to irrigation costs. Irrigation/water costs also apply to industries and municipalities. The opportunity cost of using water for irrigation should also be considered, although irrigation is likely more productive than alternative water uses in the region. (Curtis et. al., 2012)

The economic benefits of irrigation are reflected in the increased value of irrigated cropland and the increased value of crop production over what would be possible without irrigation. It also provides value to industrial and municipal uses. Because of the arid climate in the Bear River Region, crop production is highly dependent on irrigation. Of the 105,203 acres of harvest cropland in Cache County, 83,945 were irrigated (about 80%), according to a 2002 census. (Godfrey et. al., 2006) Livestock production would also not be able to be maintained at current levels without irrigated water. The percentage of the region's $502.5 million agricultural revenue that can be attributed to irrigation cannot be calculated without additional research. Canals are also an important cost saver in terms of storm water control. They save cities and counties from having to find a way to deal with storm runoff. Water in ditches also provides a water source for wildlife and may contribute to recreational opportunities if it is suitable to swim or float in.

The majority of costs associated with irrigation come from construction and maintenance. Cost estimates for proposed Utah water projects in the next two decades exceed $16 billion. This figure includes $10 billion in water supply and infrastructure, and $3.5 in storm water and drainage in Utah. The Bear River development project is expected to cost $1.5 billion, and provide water to Box Elder, Cache, Davis, Salt Lake, and Weber Counties. The Division of Water Resources estimates that repayments from the Lake Powell pipeline will be available for use on the Bear River project. This project presents unique challenges because of its scope. (OLRGC, 2012)

The Cache Community Emergency Watershed Project is estimated to cost up to $22.4 million. (Cache County, 2016) Cost estimates of various proposed water projects may be found in the Cache County Water Master Plan. The current budget for the Cache County water department is $185,000. The costs to operate a proposed water district could be around $350,000 annually, including payments to board members (up to $5,000 per member). (cachecounty.org, 2013)

A compilation of economic reports on water projects in the region have a cost range of $701,319 to $28,575,000 and benefits ranging from $808,885 to $34,575,509. The combined costs of these projects was estimated at $53,569,305; with $59,265,961 in total benefits. The average benefit/cost ratio of water improvement projects in the region was 1.11. The majority of costs for these projects comes from construction costs, with contingencies, legal and administrative, and design and construction engineering efforts making up the remainder of the costs. The benefits for agricultural water projects come from cost savings, reduced evaporation, and increased productivity. For municipal water delivery systems, benefits are calculated using "the costs of best alternative" method. For more detailed information for individual projects of cost and benefit breakdowns and cost sharing, refer to the folder titled "Water" accompanying this report.

Water Rights

As the second most arid state in the nation, Utah must ensure proper use of its limited water resources. The region's primary water source is precipitation, namely snowfall. Water rights in Utah and other Western states have historically operated under the Doctrine of Prior Appropriation. This means that the first person/organization to put water to beneficial use has priority rights over the next people who

use the water source for a productive use. Because all water in Utah is considered public property, water rights are required in order to utilize a water source.

In Utah, water rights are transferred by deed, similar to real estate. (J-U-B Engineers, 2013) A recent post on waterrightexchange.com had water rights for sale by the Cache Highline Canal Company for $3,500 per share. Another post offered a share for $3,000 in Cache County. Prices in more populated areas are generally more expensive than in rural areas.

The benefits of water rights depend on what they are used for and can be ambiguous. More information on the benefits of water in the Bear River Region may be found in the previous subsection, Irrigation.

Water Quality and Hydrology

Water quality affects and is affected by all resource uses in the Bear River Region. Agriculture is dependent on clean water to be productive, but can also be a source of water pollution. Industries in the region may have to incur extra costs to comply with federal water quality standards. Public water systems are required to be in compliance with the National Primary Drinking Water Standards. Most municipal water systems ensure compliance through watershed protection and water treatment. Private water systems like wells are not monitored as closely. Monitoring and purifying drinking water, as well as wastewater comes at a cost. Water testing equipment and personnel/oversight make up the majority of monitoring costs.

Water treatment plants can be expensive to build, and have additional operating costs. For example, Logan City plans to construct a new, $110 million wastewater treatment for its wastewater and the wastewater of six surrounding cities. The new plant is needed because the discharges into Cutler Reservoir from the current facility contain too much phosphorus and ammonia to meet federal standards. (Henline, 2014) Another cost of maintaining water quality may be a loss of recreation revenue if recreation opportunities are restricted in a watershed area.

Clean water is important for all life in the Bear River Region. The economic benefits of water quality are widespread and difficult to distinguish, but may include avoided medical costs, increased agricultural and industrial productivity, positive impacts on fish and wildlife health, and recreational benefits. The World Health Organization estimates that every dollar invested in water and sanitation provides an economic return of four dollars. (Water.org, 2016) This is probably more appropriate in developing countries with more water quality issues than Northern Utah, but goes to show that the benefits of clean water outweigh its costs. This idea is supported by a benefit-cost analysis of the Clean Water Act, in which the benefits exceeded the costs for all high and low estimate scenarios. (Army Corps of Engineers, 2015)

Flood Plains and River Terraces

Flood plains and river terraces affect planning and development. The majority of costs associated with flood plains are the result of insurance premiums and damages in the event of the flood. Flooding is not covered by homeowner's insurance, and residents in flood plains are encouraged to get flood insurance. (Utah Insurance Department, 2016)

In 2011, there were only 4,200 active flood insurance policies in Utah. The average policy cost was $609 a year for a maximum coverage of $250,000. A home in a moderate or low-risk area could be insured for slightly more than $300 a year, while a comparable home in a high-risk area could cost $2,000 to $3,000 a year. (Beebe, 2011)

Dams can act as a flood control measure but can also contribute to risks if they are breached. Of the 67 dams in the Bear River Region, 12 were rated as high hazard by the Utah Division of Water Rights. Damages of floods can consist of damaged property and crops, as well as lost productivity.

Major flooding events in Utah have cost between $700,00 and $621 million per event. (Utah.gov, n.d.) A 1983 flood in Brigham City had a total cost estimate of $146,596, and the entire county of Box Elder was affected by a flood in 1984, with total damages estimated at $331,442. A flood also occurred in Rich County in 1983, costing about $37,000. In a U.S. Army Corps of Engineers study of flood hazard identification prepared for BRAG's pre-disaster mitigation plan, new construction in low-lying areas and near rivers or canals is discouraged. For the average home located in flood prone areas in the region, flood proofing would cost around $10,000 to $30,000. In recent years, damaging flooding events in the region have been rare. (Army Corps of Engineers, 2003)

Wetlands + Riparian Areas

Wetlands are areas that are covered by water, and riparian areas are the interface between land and a river or stream, and are located along flowing water in the Bear River Region. In Box Elder County, 2,178,291 acres of land are covered in water or wetlands (51% of its land mass) according to GIS data. Cache County has 20,311 acres of water or wetlands (2.7%). Rich County has 116,662 acres of water or wetlands, 16.8 percent of its total area.

The economic values of wetlands and riparian areas come from their contribution to water quality, flood control, recreation, wildlife, and fisheries. The filtration and purification that occurs in wetlands saves communities in avoided water treatment costs. Wetlands can reduce the frequency and intensity of flooding by acting as natural buffers, absorbing a significant amount of flood water. Hiking, bird watching, fishing, hunting, and photography are popular recreation activities in wetlands and riparian areas. Wetlands and riparian areas are essential habitat for a variety of animals, including one third of threatened and endangered species in the U.S. Wetlands provide a consistent food supply, shelter, and nursery for aquatic species. (EPA, n.d.)

The Bear River Migratory Bird Refuge in Box Elder County is managed by the U.S. Fish and Wildlife Service, and contains almost 80,000 acres of critical wetland habitat for migrating birds from both the Pacific and Central Flyway of North America. The Refuge recorded 30,000 visitors in 1999, a figure that has undoubtedly risen.

The costs associated with wetlands and riparian areas in the Bear River Region come in the form of management and protection, mostly from federal and state land management agencies.

Wildlife

Hunting

The majority of hunters in the state are Utah residents (an estimated 82%), and state-wide hunting expenditures totaled $335.4 million in 2011. The average resident hunter hunts 14 days annually.

Number of Big Game Hunters Afield, FY2012

Hunt Unit	Deer	Elk	Pronghorn	Bull Moose	Sheep, Goats	Total
Box Elder	4,190	409	89	0	6	4,694
Cache	6,637	3,017	427	11	0	10,092

(Transfer Study, 2014, p. 279)

The Cache Hunt Unit includes Rich County and a sliver of Box Elder County, along with most of Cache County. In 2012, 9.3% of the 159,400 big game hunters in Utah participated in the Bear River Region. The number of hunters pursuing small and upland game per year were 7,416 in Box Elder County, 6,605 in Cache County, and 733 in Rich County. Small game includes hunting and trapping of bobcats, red fox, and beavers, and upland game includes pheasant, forest grouse, and dove. Over 30 percent of small and upland game hunting and trapping occurred in the region (out of over 48,000 hunters in the state). In total, 14.2% of hunting participation occurred in the region.

Resident and non-resident hunters in Utah spent $344,950,058 on hunting related expenditures in 2011. Based on the percentage of Utah hunters who hunted in the Bear River Region, an estimated *$48,982,908 is spent annually by hunters in the three counties combine*d (Box Elder and Cache hunt units for large game). This measure includes travel, food, lodging, and equipment expenditures. (Transfer Study, 2014, p. 286)

A number of hunters active in the region partake in hunting as a subsistence activity. The animals they harvest could be valued at the cost of food sources the hunters would otherwise have to purchase using an economic valuation technique called Benefit Transfer. Unfortunately, no regional data is available on the number of animals harvested and the meals they provided.

Wildlife Viewing

No county specific estimates are available for wildlife viewing, but based on regional hunting and fishing participation, the approximation of 14% of statewide wildlife viewing will be assumed to take place in the region (the Bear River Region covers about 10.5% of the state, but has abundant wildlife and has larger local and nearby populations than many other parts of the state). Total, state-wide expenditures for wildlife viewing were $355,033,627, yielding a *regional estimate of almost $50 million in the Bear River Region*. (Transfer Study, 2014, p. 288)

The region's wildlife also provides a level of non-market value to its residents. Many people in Box Elder, Cache, and Rich counties appreciate being able to view nearby wildlife and as a result their quality of life is improved. This improved quality of life can lead to other economic contributions. For example: if

someone in Logan appreciates their ability to see deer and turkeys that frequent their neighborhood, their willingness to pay for housing in Logan may increase.

Management Costs

The state and federal management agencies in the Bear River Region expend some of their time and funds on wildlife management, although no county-specific expenditures are available. The Utah Division of Wildlife Resources (DWR) totaled $81,168,934 in statewide expenses in 2015. (DWR, 2016)

Fisheries

Most anglers that fished in Utah in 2011 were Utah residents. On average, resident anglers fished 16 days per year. In a USU study on water-based recreation, the number of trips in 2011 where fishing was the primary activity in Box Elder County was 174,909 on lakes and 9,605 on rivers. Cache County recorded 114,247 lake fishing trips and 152,161 river fishing trips; Rich County recorded 120,819 lake trips, and 5,055 river trips. The region hosted 13.4% of Utah's 4,306,000 total fishing trips. River fishing was most popular in Cache County, while lake fishing dominated Rich and Box Elder Counties. It is important to note that fishing also often occurs as a complimentary activity to other trips, such as camping or hiking.

Total fishing expenditures by residents and non-residents in the state were estimated at $308,239,214 in 2011. Based on the percent of Utah fishing trips that occurred in the Bear River Region, *anglers spend approximately $41,289,165 annually in the three counties* combined. Spending was $13,208,186 in Box Elder County, $19,070,458 in Cache County, and $9,010,521 in Rich County. Angler spending includes trip and equipment expenditures. (Transfer Study, 2014, p. 287)

Subsistence fishing adds economic value because it provides a source of protein that would otherwise have to be purchased. The Benefit Transfer Method could be used to evaluate the economic value of subsistence fishing in the region if information on the number of fish caught and the meals they provided was available.

Management Costs

State and federal agencies spend money to manage fisheries via habitat management, fish stocking, and law enforcement; although no county or region-specific cost data is available. Statewide, the DWR's aquatics section spent $13,335,447 in 2015.

Predator Control

The main cost associated with predators comes from livestock and wildlife (deer) mortality. Though historically a more popular range for bears, bear and cougar attacks on other wildlife and livestock in the Bear River Region are not a major concern. The main focus of predator control efforts in Box Elder, Cache, and Rich Counties is reducing predation of fawns by coyotes.

The Utah Division of Wildlife Resources offers a reward of $50 for each properly documented coyote killed in the state. Utah legislation sets aside $500,000 annually from the general fund to fund the

predator control program. In 2014, 7,041 coyotes were turned in by 1,096 individuals for a total of $352,050. The same year, Utah contracted hunters turned in 236 coyotes, and were paid $140,000. A total of 12,564 coyotes were taken statewide in 2014.

Of the coyotes killed in 2014, spatial data was available for 6,664. 698 (10.5%) were removed in the Box Elder Hunt Unit, the most of any unit. 307 were removed in the Cache unit. At $50 a piece, state payments totaled $50,250 to hunters in the Bear River Region. The predator control program was found to increase the fawn to doe ratio in the state by almost five percent between 2012 and 2013. (DWR, 2014)

The resulting increase in the size of deer herds allows for more hunting tags and/or higher hunting success rates. The prior section on Wildlife highlights the economic contributions of hunting in the region.

Threatened, Endangered, and Sensitive Species

From FY2008 to FY2012, the BLM spent an average of $2,347,795 on its threatened and endangered species program in the state. (Transfer Study, 2014, p. 20) The U.S. Forest Service has a total of $716,228 in backlogged projects related to threatened and endangered species ($72,881,964 in total backlog of Utah assets). (Transfer Study, 2014, p. 55) There are 17 animals and 25 plants listed as endangered or threatened by the U.S. Fish and Wildlife Service in Utah. The Utah Division of Wildlife Resources (DWR) maintains a list of sensitive species in the state. Six endangered and threatened animals are listed in Box Elder County, five are listed in Cache County, and three are listed in Rich County. This includes animals and plants that are currently found in each county, as well as historical and suspected species present. (ut.ngb.army.mil, n.d.) The threatened Maguire Primrose is a flower found only in Logan Canyon, and has resulted in the restriction of rock climbing in the canyon.

The majority of economic benefits of threatened, endangered, and sensitive species come from their contribution to wildlife viewing expenditures and their existence value: the value people get from simply knowing that a species is not extinct. Wildlife viewing expenditures are almost $50 million annually in the region, as seen in Wildlife Viewing. Areas that are preserved for the protection of sensitive species may also provide economic value through ecosystem benefits. The research of endangered species can be valuable; some wildlife and plants have contributed to medical breakthroughs. (Defenders of Wildlife, n.d.)

The costs of endangered and threatened species include management costs and the potential loss of economic activity on protected lands (opportunity cost). A person who "takes" a protected species may be fined up to $25,000 by the federal government. The state has spent between $1 and $2 million on protection of sage grouse to prevent them from being federally listed. Governor Herbert estimated that federal listing of sage grouse as endangered could cost the state $41.4 billion in lost economic development. In the Bear River Region, where energy development is not as prominent of an issue, the costs associated with protecting the sage grouse are probably not as dramatic. With a consumer surplus of more than $32 per day, rock climbing opportunities lost in Logan Canyon due to restrictions have a

significant economic impact. (Transfer Study, 2014, p. 263) The Utah DWR's annual budget is usually around $2.5 million, a portion of which goes to efforts to protect sensitive species. (Ballotpedia, 2016)

Recreation and Tourism

Employment in Industries that Include Travel and Tourism

Travel and Tourism: Consists of sectors that provide goods and services to visitors to the local economy, as well as to the local population. These industries are: retail trade; passenger transportation; arts, entertainment, and recreation; and accommodation and food. It is not known, without additional research such as surveys, what exact proportion of the jobs in these sectors is attributable to expenditures by visitors, including business and pleasure travelers, versus by local residents. Some researchers refer to these sectors as "tourism-sensitive." They could also be called "travel and tourism-potential sectors" because they have the potential of being influenced by expenditures by non-locals. In this report, they are referred to as "industries that include travel and tourism."

Employment in Travel & Tourism, 2014

	Box Elder County, UT	Cache County, UT	Rich County, UT	County Region	U.S.
Total Private Employment	16,753	39,326	389	56,468	121,079,879
Travel & Tourism Related	~1,676	~5,212	~88	~6,976	18,806,854
Retail Trade	~266	1,235	~21	~1,522	3,390,694
Gasoline Stations	220	373	~17	~610	904,084
Clothing & Accessory Stores	~17	611	0	~628	1,736,053
Misc. Store Retailers	29	251	~4	~284	750,557
Passenger Transportation	0	0	0	0	454,111
Air Transportation	0	0	0	0	428,799
Scenic & Sightseeing Transport	0	0	0	0	25,312
Arts, Entertainment, & Recreation	~137	~797	~3	~937	2,170,121
Performing Arts & Spectator Sports	~13	143	~1	~157	474,256
Museums, Parks, & Historic Sites	0	~20	0	~20	143,298
Amusement, Gambling, & Rec.	124	634	~2	~760	1,552,567
Accommodation & Food	1,273	3,180	~64	~4,517	12,791,928
Accommodation	113	197	~36	~346	1,998,716
Food Services & Drinking Places	1,160	2,983	28	4,171	10,793,212
Non-Travel & Tourism	~15,077	~34,114	~301	~49,492	102,273,025
Percent of Total					
Travel & Tourism Related	~10.0%	~13.3%	~22.6%	~12.4%	15.5%
Retail Trade	~1.6%	3.1%	~5.4%	~2.7%	2.8%
Gasoline Stations	1.3%	0.9%	~4.4%	~1.1%	0.7%
Clothing & Accessory Stores	~0.1%	1.6%	0.0%	~1.1%	1.4%
Misc. Store Retailers	0.2%	0.6%	~1.0%	~0.5%	0.6%
Passenger Transportation	0.0%	0.0%	0.0%	0.0%	0.4%
Air Transportation	0.0%	0.0%	0.0%	0.0%	0.4%
Scenic & Sightseeing Transport	0.0%	0.0%	0.0%	0.0%	0.0%
Arts, Entertainment, & Recreation	~0.8%	~2.0%	~0.8%	~1.7%	1.8%
Performing Arts & Spectator Sports	~0.1%	0.4%	~0.3%	~0.3%	0.4%
Museums, Parks, & Historic Sites	0.0%	~0.1%	0.0%	~0.0%	0.1%
Amusement, Gambling, & Rec.	0.7%	1.6%	~0.5%	~1.3%	1.3%
Accommodation & Food	7.6%	8.1%	~16.5%	~8.0%	10.6%
Accommodation	0.7%	0.5%	~9.3%	~0.6%	1.7%
Food Services & Drinking Places	6.9%	7.6%	7.2%	7.4%	8.9%
Non-Travel & Tourism	~90.0%	~86.7%	~77.4%	~87.6%	84.5%

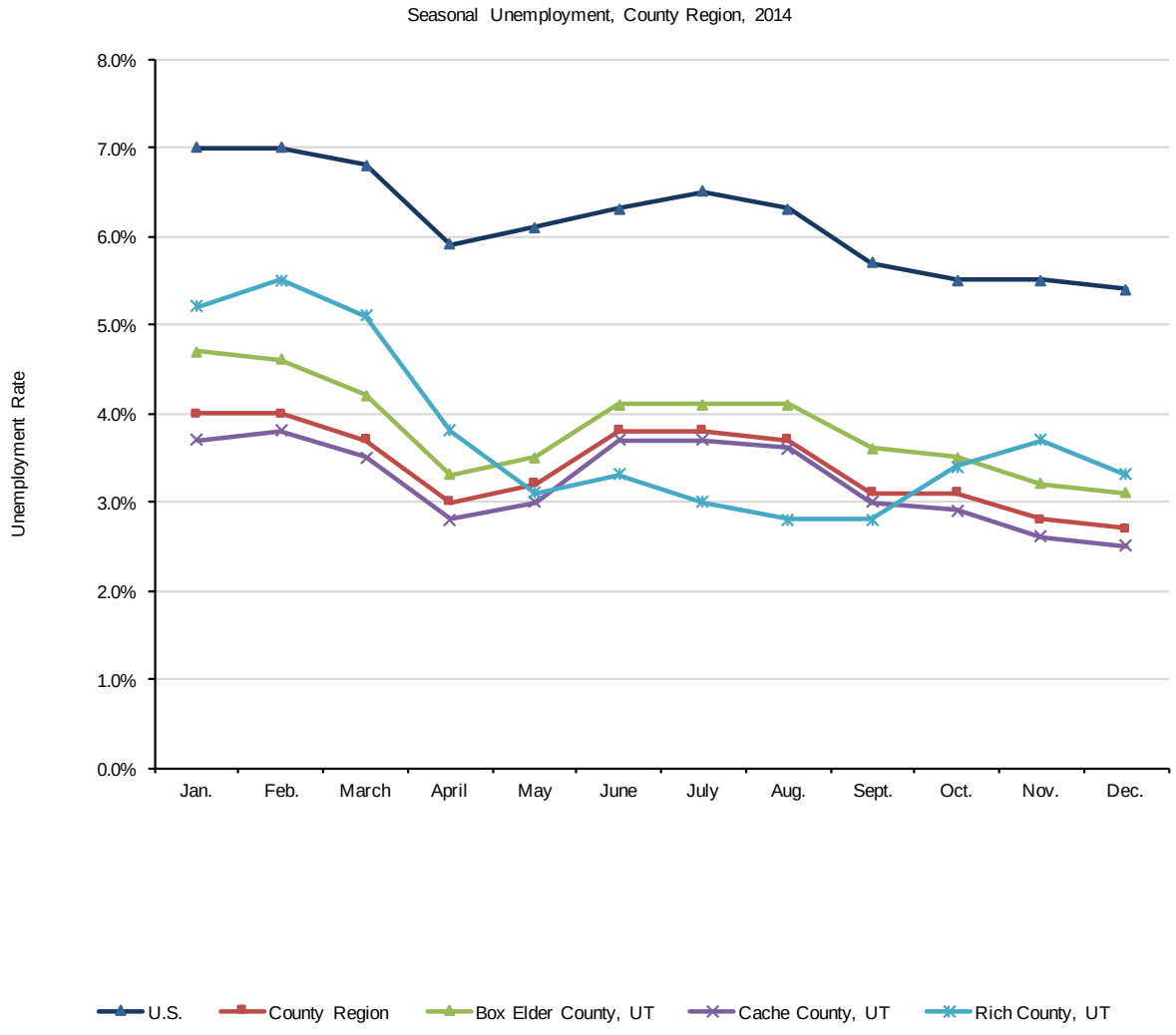
Data Sources: U.S. Department of Commerce. 2016. Census Bureau, County Business Patterns, Washington, D.C.

The most significant contribution of jobs in travel and tourism related industries is found in Rich County, making up 22.6% of all jobs. Cache County has the most Amusement, Gambling, and Recreation jobs (the only recreation-specific sector) at 634. Recreation and tourism jobs were slightly less common in the region than the national average. It can be assumed that a portion of these jobs are supported by people coming to the region to recreate on public and other lands. Travel and tourism jobs have

hovered around 12% of private employment in the region since 1998. 1,045 accommodation and food service jobs have been created since 1998, while retail trade has declined slightly.

The average annual wages for travel and tourism related jobs in the region were $12,638; falling short of the national average for recreation and tourism jobs of $22,417, and the average of $32,887 for private sector jobs in the region. People may be willing to accept lower wages in Northern Utah if they feel they can have a high quality of life and because of the low cost of living.

Seasonal Tourism Employment



Data Sources: U.S. Department of Labor. 2015. Bureau of Labor Statistics, Local Area Unemployment Statistics, Washington, D.C.

Rich County displays the most seasonal unemployment, while the other counties remain more steady throughout the year. A likely explanation for this change in employment is the availability of summer-seasonal positions related to recreation on and around Bear Lake. Some seasonal workers might not live in the county year round, and therefore would not be reflected in seasonal unemployment

measures. Agricultural workers can also contribute to seasonal unemployment. Box Elder and Cache Counties have a larger share of employment in non-service jobs, causing their unemployment rate to remain more consistent throughout the year.

Although none of the data in this section can provide a concrete measurement of the economic benefits of recreation in the Bear River Region, it can provide insights into the effects of recreation and tourism that combined can be used to gain a general idea of the role they play in the regional economy. Although recreation provides a definite contribution to the regional economy, it is probably not the economic driver it is in other parts of the state. Part of the reason being that there are more industries present that are not tied to public lands, unlike some counties in Southern Utah. The geography and climate in the region are also similar to the mountains and forests in other western states, making Northern Utah less of a unique destination. Travel and tourism do play a larger role in rural Rich County, where the population is small and there is a major tourist destination in Bear Lake. The importance of tourism in Rich County is reflected by the high percentage of service jobs and the seasonal unemployment rate.

Recreation is an important aspect of the economy because the outdoor recreation economy grew approximately five percent annually between 2005 and 2011, according to the Outdoor Industry Association. This period of growth includes the Great Recession, proving that recreation can continue to grow even in times of economic hardship. In 2012, Utah attracted 23.5 million nonresident visitors. Although the Bear River Region probably does not attract the level of international visitors and visitors from non-adjacent states, people from neighboring states often travel to the region for its recreational opportunities. (Transfer Study, 2014, p. 257)

Direct economic impacts are just one aspect of the total value of recreation on public lands. Outdoor recreation is known for having particularly high "consumer surplus," meaning that the participants would be willing to pay more for the experience they have than they actually spend. Recreational opportunities contribute to an improved quality of life for residents of the region. Utah has abundant recreational opportunities and as a result, residents are more than twice as likely to participate in several outdoor recreation activities than the national average. The total economic value of recreation and travel in Utah is approximately $16.9 billion; $9.8 billion in resident and nonresident spending, and a net benefit or economic "surplus" to Utah residents of $7.1 billion. Net benefit measures willingness to pay in excess of what is actually spent. It is important that the quality of public lands in the Bear River Region be maintained, or even improved, to continue to contribute to the prosperity and quality of life of its residents. (Transfer Study, 2014, p. 276)

State Parks

Each county contains a state park located at a reservoir or lake used primarily for boating, fishing, swimming, and camping.

State Park	County	Square Acres	Annual Visits	Revenue	Expenses	Profit	Expenses per Acre
Bear Lake	Rich	965	172,182	$1,117,645	$660,260	$457,385	$684

Hyrum	Cache	676	83,001	$294,130	$234,465	$59,664	$347
Willard Bay	Box Elder	12,649	266,331	$797,384	$726,531	$70,854	$57

(Transfer Study, 2014, p. 25)

All three state parks in the region operate with a profit, which contrasts any Utah State Parks; all of the parks combined run a deficit of over $300,000 annually.

Local Participation

Based on their amount of protected land, an estimated 67.4% of residents in Cache and Box Elder Counties participate in 6 or more outdoor recreation activities, according to the Public Lands Transfer Study. The estimate for Rich County is 71.1%, which is somewhat counterintuitive because it has less protected land. Overall, the relationship between survey responses and the amount of protected and federal land in a county were generally weak. (Transfer Study, 2014, p. 561)

Fish and Wildlife Recreation

The estimated economic and fiscal contributions of hunting, fishing, and wildlife viewing in Utah in 2011 were 11,815 jobs, $340.6 million in earnings, and $657.2 million in gross state product (GSP). GSP is a measure of economic output and is the sum of all value added by industries within the state. An estimate of 14% of these impacts can be attributed to the Bear River Region; 14.2% of hunters afield and 13.4% of fishing trips occurred in the area. This calculation yields the approximate *regional economic impacts of fish and wildlife based recreation in the region at 1,654 jobs, $47.7 million in earnings, and $92.0 million in GSP*. About 40 percent of these impacts are the result of expenditures of nonresident visitors and would be considered true economic impacts because they are bringing "new," outside dollars into the regional economy. Using the same technique, estimated regional taxes are $12.4 million in state revenue and $2.3 million in local tax revenue are the result of hunting, fishing, and wildlife viewing spending. (Transfer Study, 2014, p. 289)

For hunting-specific information, see Wildlife. For fishing-specific information, see Fisheries.

Cultural, Historical, Geological, and Paleontological Resources

The cultural, historical, geological, and paleontological resources in the Bear River Region contribute to recreational visits and activities and their associated economic impacts. The Bear River Heritage Area extends into Southeast Idaho, and highlights the natural, historical, and cultural experiences available in the Bear River Basin. Their website states: "We are dedicated to economic development through promotion and stewardship of the cultural and natural resources that are unique to this region." Some of the Heritage Area's featured attractions are:

- The Bear River Migratory Bird Refuge
- Golden Spike National Monument
- Scenic drives
- Outdoor recreation

- The American West Heritage Center
- Utah Festival Opera company
- Utah State University
- Bear Lake- The Caribbean of the West
- The Oregon/California Trail
- The Minnetonka Cave
- Various food-related points of interest

Wilderness

Cache County has 54,243 acres of designated wilderness on Forest Service lands and Box Elder County has 11,268 acres (7.3% and 0.3% of their total area). Rich County does not have any federally-designated wilderness areas.

As seen earlier in this report under the Management Designation subsection of Land Use, there are a total of 240,996 acres of federal lands managed as Wilderness Study Areas or Inventoried Roadless Areas in the region. 174,357 acres of these "Type B" lands are in Cache County. In addition to existing wilderness study areas, 17 percent of BLM lands statewide were found to be Lands with Wilderness Characteristics (Transfer Study, 2014, p. 702). A significant portion of public land in the Bear River Region has, so far, been preserved in its natural state.

The federally designated wilderness areas and wilderness-quality lands do play a role in the region's economy by contributing to the effects of Recreation and Tourism, in addition to their non-market value to local populations. Wilderness is valuable because it provides a baseline landscape largely unaffected by human activity, as well as offers unique opportunities for primitive recreation activities and solitude.

A number of studies have found the average value of wilderness recreation (in the form of consumer surplus) at $84 per-person per-day. As with other types of outdoor recreation, spending on gas, groceries, supplies, and more can benefit "gateway" communities. The value of U.S. wilderness is estimated at $3 to $4 billion annually, including use and non-use values (Loomis, 2001). Wilderness is also associated with non-use values such as bequest, option, and existence value. Bequest value is the value people place on the ability to pass a certain resource on to future generations. Option value is based on what people would be willing to pay to have the opportunity to experience wilderness areas, regardless of whether or not they used them. Existence value is based on the value people gain from simply knowing that the wilderness is there. The International Journal of Wilderness produced a conservative estimate of these values at $5 billion annually. (wilderness.net, n.d.)

The ecosystem services of wilderness include watershed protection, carbon sequestration, water filtering, fish/wildlife habitat, and nutrient cycling. The Forest Service estimates that the water for one in five people in the U.S. comes from wilderness. The International Journal of Wilderness estimates the value of these ecosystem services at $3.5 billion a year. Scientific studies are common in wilderness areas because they are the areas least affected by human activity.

Wild and Scenic Rivers

There are not any federally-designated wild, recreation, or scenic rivers in the region. A few creeks and rivers (including the Logan River) in the area were considered for designation as scenic or recreational rivers but were ultimately not selected. Rivers are an important water source for many human uses. The region's rivers and streams also contribute to recreation and its associated economic impacts, and angler spending in particular.

Land Access

UDOT's transportation fund was over $300 million in 2015, which was about 70 percent of their net revenue from taxes and fees. Of this amount, $132 million was distributed to counties and cities statewide. Federal air-quality related transportation funding in 2015 was $211,912 in Box Elder County and $570,599 in Cache County. Cache County received $5,129,241 in class B and C UDOT road distribution funds in 2015, Box Elder County received $3,821,021, and Rich County received $503,854. B & C funding is calculated using length of road and pavement type, and are distributed to the counties and their cities. (UDOT, 2015)

Box Elder, Cache, and Rich Counties receive $50,589; $166,183; and $21,554, respectively, in federal land payments for use on county roads, as seen in Federal Land Payments. The Utah Department of transportation receives federal funding for road projects via the Federal Lands Access Program (FLAP) and the Federal-Aid Highway Program (FAHP). In FY2013, the state received $10.8 million from FLAP and $286.1 million from FAHP. FLAP payments are dependent on the amount of federal land in the state. State matches on transportation in Utah are lower than in other states because of its high percentage of federal lands. (Transfer Study, 2014, p. 235)

The Cache County Road Department consists of an 18-person crew. They take care of approximately 200 miles of paved road and 400 miles of gravel and dirt roads, many of which are mountain and forest service roads. They are responsible for plowing and maintenance of county roads. In 2009, $5,153,859 in grant funds was made available in Cache County, with almost $2.5 million going to the Utah Department of Transportation (UDOT), and more than $2.6 million going to the Cache Valley Transit District (CVTD). The CVTD's budget was about $5.6 million in 2014. (Cannon, 2014)

Almost all land and resource uses in the Bear River Region are dependent on a reliable land access system. Most of the economic impacts of these uses would be impossible without road infrastructure.

Law Enforcement

City, county, and state law enforcement personnel and expenditures account for the majority of law enforcement costs in the region. A portion of state and federal public land management budgets go to law enforcement. Utah Division of Natural Resources, USFS, BLM, and USFWS rangers are all trained in law enforcement. Rangers combat illegal activities on public land as well as crimes against wildlife and public property. The total cost of law enforcement in the region is the sum of local and state law enforcement spending plus a portion of the estimated $15,946,248 federal land management costs in

the three counties (from Land Use). Statewide, the BLM spent an average of $379,270 on direct law enforcement costs, 0.3% of its total expenditures. The Utah Division of Wildlife Resources spent an average of $8,694,060 on law enforcement statewide for FY2009- FY2013, nearly 17 percent of its annual expenditures.

The economic benefits of law enforcement are difficult to quantify, but include improvements to quality of life, reduced theft and damages to property and goods, and the protection of at-risk populations.

Air Quality

Most activities and industries in the Bear River Region have some effect on air quality. In the summer, the most volatile and possibly hazardous contributor to air pollution is wildfire. In September 2012, wildfire was to blame for up to 85 percent of Cache County's PM 2.5 concentration of 18 micrograms per cubic meter. In June 2008, PM 2.5 concentrations in Box Elder County reached 42.7 micrograms per cubic meter, with 58.4% attributed to wildfires in Nevada and California. The Environmental Protection Agency (EPA) standard is 12 micrograms per cubic meter. Although these are extreme events of wildfire pollution, a portion of the region's pollution is consistently caused by wildfires in the summer. (Transfer Study, 2014, p.525)

In the winter, the Bear River Region can experience concerning levels of PM 2.5 due to a weather pattern referred to as an "inversion." The inversion can be particularly bad in Cache County, which is an area of nonattainment for EPA PM 2.5 standards. High pressure systems cause temperature inversions to form, acting as a lid over the bowl-like topography of Cache Valley, and trapping pollutants in the valley. (DEQ, n.d.) The majority of these pollutants are emitted by motor vehicles and livestock. A variety of strategies have been and are being pursued to combat the pollutant levels, including a vehicle emissions testing program.

The economic impacts of poor air quality in Utah include: corporate relocation, tourism, quality of life, healthcare costs, population growth, transportation planning, and regulatory burdens on businesses. (good4utah.com, 2016) The healthcare-related costs of air quality are based on lost productivity, doctor/hospital visits, and even death. Overall, the net benefit of air quality regulations is generally high. The 2010 nationwide estimate of net benefits of the Clean Air Act is $110 billion to $2.7 trillion. (EPA, n.d.)

In 2015, a group of Utah State University undergraduate students ran a benefit-cost analysis of the vehicle emissions testing program in Cache County. They found a total, discounted cost range between $114,196.50 and $236,513.64. This was an estimate of money leaving the local economy, and does not include transfer costs within the county, such as the testing fee of $15 per vehicle paid to certified mechanics by car owners. The range of benefits found was $769,141- $1,742,098 using the EPA's Co-Benefits Risk Assessment (COBRA) screening model, and $805,294- $1,932,541 using two separate surveys. The COBRA tool could be a useful resource in estimating the economic and health effects of

alternative future scenarios, based on changes in air pollution, defined by County Resource Management Plans. It is available for free on the EPA website.

Excel files of the EPA's estimates of emissions by source in each county for the year 2017 are included in this file. Wildfire is the largest source of sulfur dioxide, PM 2.5, and volatile organic compound emissions in each county. Livestock is the largest producer of ammonia in all three counties. Natural sources and motor vehicles emit the most mono-nitrogen oxides.

Using COBRA, if all sources indicating at least one ton of any type of emission are reduced by 100 percent (including natural sources) in all three counties, the results can be used as an estimate of the total economic and health effects of emissions in each county. In Box Elder County, the zero-emissions scenario results in a high estimate of $22,645,199; and a low estimate of $10,035,029. The range of values in Cache County is $27,472,200- $61,820,350. In Rich County, the estimated health-related cost of all emissions is $614,566- $1,381,339.80. The majority of these costs are the result of reductions in adult mortality, estimated at between one and three in Box Elder County, three and eight in Cache County, and less than one in Rich County. It is important to note that these costs are "net present value" estimates of avoided healthcare costs if all emissions in the counties ceased, using a discount rate of seven percent.

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The EPS tool was used to compile data and create tables and graphs from federal data sources in July of 2016. It is available for free use on the *Headwaters Economics* website (headwaterseconomics.org/eps). The EPS data included in this report come from the following sources:

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The data sources used in tables and graphs from EPS reports is listed with the table or graph and is not replicated here. All tables and graphs listing data sources immediately after were created by EPS. All EPS reports used are included in the same folder as this document.

Land Transfer Economic Analysis

An Analysis of a Transfer of Federal Lands to the State of Utah was prepared for the Public Lands Policy Coordination Office by Jan Elise Stambro, John C. Downen, Michael T. Hogue, and Levi Pace at the University of Utah; Paul M. Jakus at Utah State University; and Therese C. Grijalva at Weber State University in November 2014. It was an exhaustive effort to assess the economic impacts of the proposed transfer of federal lands in the federal government to the State of Utah. It is cited as "Transfer Study" in this report and is available (in pdf form) in the same folder as this report here.

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